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THE RICE INSTITUTE PAMPHLET

VOLUME THREE



Published by

THE RICE INSTITUTE

A university of liberal and technical learning
founded by William Marsh Rice in the City of
Houston, Texas, and dedicated by him to
the advancement of Letters, Science, and Art

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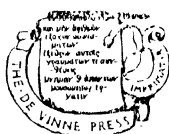
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PREFACE

WHEN they clapped a huge mustard plaster on poor Tom Hood, emaciated from his last illness, that incorrigible punster remarked that it seemed like a good deal of mustard for very little meat. To many, including the writer, it must appear that this volume carries a great deal of title for very little book. If the "onlie begetter" of this thing could have thought of a shorter title, he would have used it, but his invention could contrive nothing briefer that would indicate what the book is about. Long as it is, it requires explanation: by "Approaches," the writer means the novelists' manner of approaching life, their philosophies; by "Reactions," he means his own responses to their methods of saying what they had to say, their art; by the whole title, he intends a disclaimer that this little book is "exhaustive," "comprehensive," "authoritative," "scholarly," or any of those important things which books in criticism are sometimes supposed to be.

These short essays were originally public lectures delivered in the assembly hall of the Rice Institute in Houston, Texas. They are general in their plan and undogmatic in their purpose. The trail of the serpent, the platform manner, is still on them; for, though they have been pulled about a bit and toned down a little, they remain as much lectures as essays, as the judicious will perceive from many signs, including the free and frank use of the first personal pronoun.

DICKENS AND SOCIAL REFORM

FROM some of the writings of Matthew Arnold and from the minor novelists and minor poets of the latter part of the nineteenth century we of the end-of-the-century generation deduced the conclusion that things are important in inverse ratio to their size. The smaller a thing, the more important. That novel was great in which least happened; that novel was greatest in which nothing happened. It came to be impolite for anything to occur in a novel. Those were evil days for Dickens.

We were reading big men even in those days, but the important thing about them was not their bigness. We read Wordsworth for his revelation of the minor pains of minor people; we read Browning for his skill in shading a spiritual motive to the vanishing-point; we read Tennyson because he helped us to endure life with a minimum of faith; the finest thing in Shakespeare was his observation that a willow leaf is white on the under side.

Of course the really important thing about Shakespeare was his power to understand a whole world of people and to recreate them in valiant poetry for a practical stage; the really important thing about Browning was that he had enough fire in his soul to burn up the sins of the world; the really important thing about Tennyson was that he fought down enervating melancholy, the habits of a word-fancier, and became a man, and the representative voice of masses of men; the really important thing about Wordsworth was that he went below superficial differences and showed the eternal cosmopolitan in the provincial. But all that was too robust for us in those dying years of the nineteenth century.

As I look back on that time and the mental attitude of

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myself and my contemporaries, I am at a loss to explain why we seemed to think that because the century was dying it was necessary for us to die also. But there we sat in our languors and our mild despairs, reading the unhappy confessions of diarists, small novelists, and smaller poets. The poets and diarists wrote to tell us how miserable they were, and the novelists wrote to tell us how miserable all the rest of us were, and all agreed that the case was hopeless. Something in a minor chord and a dim light, something pensive, "hushed," and neutral-tinted,—that was what we wanted and that was what we got.

That was no time for the novels of Dickens,—Dickens, so unrefined and sensational, with his hilarious laughter and unrestrained tears, and his passion for making things happen in a novel. It was vulgar to care for Dickens in those days. Fortunately there were plenty of vulgar people who gloried in their vulgarity; fortunately there are always such in the world; it is they who save the world from dry-rot. But superior people, they who set the taste and wrote the reviews for the end-of-the-century, dismissed Dickens with one awful inclusive damnatory word,—a shuddering, withering, blasting word,—they called him "Mid-Victorian," and that ended it. The world had grown critical and psychological and pessimistic, and what could poor enthusiastic, optimistic Dickens do but slink away and hide his obstreperous head?

But about the beginning of the century the tide turned again. The century had hardly opened when books and magazine articles began to show that Dickens was again being read, not only by the dear and important mass of people who read books just to enjoy them, but also by that less important and less dear class who read books to write about them. By some mysterious law of human change, a fresh vigor came into American and British thought with the open-

ing of the new century, and it was inevitable that a fresh taste for the vigorous Dickens should follow.

Dickens was too splendidly alive to be permanently repressed. When that foregone generation, of which I was so completely a part that I feel at liberty to express my unfavorable opinion of it, neglected Dickens, it was no sign that Dickens was dead; it was only a sign that that generation was dying. Happily we revived before it was too late. And then there revived a relish for lively Dickens. Then it was that we saw that an author may be supremely important even though he does sometimes offend against the minute niceties of art, even though he sometimes outrages true moral perspectives, if only he is thoroughly alive, fascinatingly exuberant. Feeling a new zest for life, we once more got out the Dickens novels; still saw their faults,—faults so obvious that it would be child's play to indicate them,—but saw also and felt their power: a power to arouse laughter and great joy, tears and broad sympathies; a power to infect us with a new gratitude for life and the world. We found that we had latent and larger capacities than had been stirred by the languid ladies and gentlemen whose correct and feeble performances had left us mildly melancholy and sweetly discouraged.

The exuberant temperament of Dickens had naturally led him to an exaggerated literary method, an exaggeration which offends those who want restraint and poise in all things. It is rather a pity that people should limit their pleasures by arbitrary literary prescriptions and consequent dislike of those works which violate the qualities prescribed. It is unfortunate that one's admiration for the spontaneous .. simplicity of Wordsworth should lead him to a distaste for the spontaneous ornamentation of John Keats. "The world is so full of such a number of things" that it is a pity to select

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for enjoyment only a particular class of things and reject all earth's other bounty. The exaggerations of Dickens would never do for Miss Austen nor even for Thackeray, but they are a part of the bigness of Dickens, a part of his original and personal and vivid way of seeing and relishing this good, good world, as natural to him as the vivacious tones of his voice or the erect carriage of his head.

His humorous characters are exaggerated, caricatures, of course. In most of them Dickens took hints from nature, but being a colorist and no slavish copyist, he embellished and exaggerated nature with all his prodigal fancy and vocabulary. Mr. Micawber was more gloriously magniloquent and resilient, more comically depressed by small misfortunes and more sublimely optimistic under great misfortunes, than the elder Dickens or any actual prototype ever could have been. Never was there any real person so bland as Mr. Pickwick, so guileless and benignant, so perfect in the art of getting into scrapes. Nobody could have been quite so continuously jaunty as Dick Swiveller, or jolly as Mark Tapley. Never was there a woman quite so flighty as Mrs. Nickleby, or a man so explosive as Mr. Mantalini. Never was there anybody quite so grotesque and impersonal as Jack Bunsby, or quite so thick-headed and so lovable as Mr. Toots. And never from all of Nature's unlimited resources did she create so gorgeous an absurdity as Mrs. Gamp and her mythical friend Mrs. Harris.

Equally exaggerated are the hypocrites, and almost as funny. Happily, Nature never produced anything quite so slimy as Uriah Heep, so unctuous as Mr. Pecksniff, so oily as Chadband, who gave the impression, says Dickens, "of having a good deal of train-oil in his system." In the same manner are the villains. Nature does fairly well when she sets out to make a thoroughly bad man, but she scarcely

makes one as deliberately and calculatingly bad as Carker, as revoltingly bad as Quilp. The heroes and heroines are exaggerations of all the virtues; no examples are necessary.

Those personal descriptions of garb and gait and countenance by which he introduces so many of his characters are exaggerated; for instance, the metallic Miss Murdstone:

"She brought with her two uncompromising black boxes with her initials on the lids in hard brass nails. When she paid the coachman she took the money out of a hard steel purse, and she kept the purse in a very jail of a bag which hung from her arm by a heavy chain and shut up like a bite. I had never at that time seen such a metallic lady as Miss Murdstone."

Or the wooden Silas Wegg:

"Wegg was a knotty man and close-grained, with a face carved out of very hard material, with just as much play of expression as a watchman's rattle. When he laughed certain jerks occurred in him, and the rattle sprung. Sooth to say, he was so wooden a man that he seemed to have taken to his wooden leg naturally, and rather suggested to a fanciful observer that he might be expected—if his development received no untimely check—to be set up with a pair of wooden legs in about six months."

Or the thick and overlapping Mr. Boffin:

"He wore thick shoes and thick leather gaiters and thick gloves like a hedger's. Both as to his dress and himself, he was of an overlapping rhinoceros build, with folds in his cheeks, and his forehead, and his eyelids, and his lips, and his ears."

The word-play of Dickens is exaggerated: "Madame Mantalini wrung her hands for grief and rung the bell for her husband; which done, she fell into a chair and a fainting-fit simultaneously."

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His "strong scenes," to speak in theatrical language, are exaggerated, unrestrained in sentiment and expression, florid, running into rhythm like oratory. Yet who will say *they are ineffective, those famous death scenes, the murder of Nancy, the execution of Sydney Carton, the death of little Nell, of little Jo, of little Paul Dombey?* Perhaps we prefer the quieter way in which Colonel Newcome takes his departure. But may we not like both styles? Thackeray himself did, for he wrote the one and admired the other. When Thackeray read Paul Dombey's death he rushed into Mark Lemon's office, threw the book on the table, and exclaimed, "There's no writing against this; one has n't an atom of chance. It is stupendous!" I think no one need be more fastidious than fastidious Mr. Thackeray.

Dickens was maintaining the traditions of his eighteenth-century masters who wrote novels before the world had grown critical. When Fielding made a good man he made him good, like Mr. Allworthy, and when he made a bad man he made him bad, like Blifil. It was the nineteenth century, with its twilight of faith, its scientific doubts, and its timidities, that had taken to shading vice and virtue until distinctions were all but lost. But Dickens kept the old vigor of the older time, when men were confident of themselves, knew what they meant and meant what they said, and drew their distinctions sharp and clear. His good people were absolutely good, like Tom Pinch and Ruth and Agnes and Lizzie Hexam. His villains were total villains, like Carker and Quilp. His hypocrites were complete hypocrites, like Pecksniff, Chadband, and Uriah Heep. His disagreeable people were entirely disagreeable, like Mrs. Wilfer. His rogues were unmitigated rogues, like Fagin and Bill Sikes. His grafters were outright grafters, like Bumble.

In respect of character drawing, Thackeray and George Eliot were more of their own nineteenth century, more given to complex shadings. Rawdon Crawley is a rake and a bounder and a good deal of a brute, but Rawdon Crawley is a man, and so he has our sympathy in the hour of his trial. My Lord Castlewood is a gambler, duelist, and libertine, but a wonderfully lovable fellow. Major Pendennis is a worldling and a slob, but it is quite impossible not to admire, even if secretly, the plucky old fellow, with his limited but strict ideas of duty. Captain Arthur Donnithorne betrays an innocent girl, but he is not a calculating villain like Carker, nor yet a melodramatic one, like Steerforth. Tito declines every responsibility, is false to every obligation, and meets deserved ruin, but leaves us mourning the overthrow of one so engaging as he had been. Then there is Lady Castlewood, so good and true a woman; but she is jealous and sometimes unjust, and three times sudden and violent in anger. Ethel Newcome is a fine loyal girl, what young men frequently call an "ideal girl," but she is sometimes arrogant and sometimes petulant. Even Colonel Newcome, the perfect chevalier of nineteenth-century British fiction, grows irritable as he grows old, grows suspicious as he grows poor, grows peevish as he grows ill. Dorothea Brooke is too noble to be tampered with by criticism, but she does suggest to the unregenerate that a little common sense would be an admirable thing to have on hand when one sets out on a "mission" in life. And though Adam Bede is a fine hero, he is sometimes a rather trying person, and sometimes a little heavy in his conversation. The people in the novels of Thackeray and George Eliot are never altogether good and seldom altogether bad. Some goodness qualifies the bad, some meanness discolours the good.

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Which is the more faithful to life, Dickens or Thackeray and George Eliot? Surely Thackeray and Eliot. Charity says it, and so does observation of our fellow-men:

“In men whom men condemn as ill
I see so much of goodness still,
In men whom men have called divine
I see so much of sin and blot,
I hesitate to draw the line
Between the two, where God has not.”

Judging as we hope God judges, we trust there is none absolutely lost in evil:

“My own hope is, a sun will pierce
The thickest cloud earth ever stretched:
That after Last returns the First,
Though a wide compass round be fetched;
That what began best, can't end worst,
Nor what God blessed once, prove accursed.”

But we are not gods but men, and we are fighting men. Every soldier who is also a philosopher—and there are many such—knows that there is honor, patriotism, truth, and loyalty on the other side. Do you suppose that the grave man in gray, he of the sad eyes bent on the wheat-fields and orchards that lay between his lines and the phalanxed blue on the rising ground of Gettysburg, thought that that marshaled enemy were all villains? You know very little of the character of General Lee if you so believe. But as a soldier it was his business to treat them as if they were villains, criminals, and wild beasts,—to kill them. A man cannot afford to philosophize very much when he is fighting. He must judge with absolute judgments. He must fight not in

the twilight of the doubt, but in the sharp distinctions of light and dark.

Dickens was a fighter. He believed that the world was good enough to fight for. He believed it was so good that it was worth a bold fight to make it better. So he must not muddy his judgments with partial verdicts; he must see good as good, and evil as evil in clear distinction, and without compromise. He must do everything in his power to change Britain because he believed Britain was worth changing. He had learned various lessons from the French Revolution, and with all his eager energy he undertook to apply them to his own country in his own day. It was the social rather than the political aspect of the convulsion which impressed him. He was less concerned with abstractions about "Liberty" than with applications of "Fraternity" and "Equality." But above all the other lessons that he got from the Revolution there was this, that misery is not "in the nature of things" and incurable, but contrary to the nature of things and hence curable. One kind of resignation has been defined as "a patient endurance of curable ills." Long before the eighteenth-century Revolution there had been upheavals for political and religious liberty, but moral and economic inequalities were tacitly accepted as conditions of existence on earth. The religious had hoped that these would be adjusted in heaven, but eighteenth-century revolutionists were impatient of that far-off consummation. They believed that society itself is largely responsible for earth's inequalities, and that what man has done man can undo. Hence France had flamed with hot resolution to suppress suppressible wrong and to realize realizable good. Nineteenth-century England was in peril of catching fire from the embers of the eighteenth-century French Revolution, a peril discerned by many, in-

cluding Carlyle, and averted by the great Reform Movement of 1830 to 1850, bloodless reform instead of bloody revolution, a movement offering remedies which Carlyle perversely declined to accept while he fatuously harked back to medieval despotism as a cure-all.

What Carlyle scornfully rejected Dickens gladly accepted. He turned no backward pensive look on bygone times. He knew that human affairs, like the hands of the clock, move forward. And he wanted things to go forward even faster than they were moving in Great Britain. He wanted more reform, and more far-reaching reform, than England was getting, for he was not only a democrat and a progressive,—he was a radical of the radicals. If political and social institutions stood in the path of human betterment they must go. He had no reverence for British institutions either because they were institutions or because they were British. As reporter of debates in the House of Commons, he had taken written notes of the speeches and mental notes of the speakers, with the result that he had a very moderate opinion of the average "M. P.," and no opinion at all of parliamentary processes. He vigorously declined urgent calls to stand for Parliament because he had a contempt for Parliament and an emphatic determination not to be trussed up with its red tape and gagged with its "procedure." He judged that he could accomplish more as a free-lance agitator for reform in public speeches and in his novels.

Because things "had always been so" was, to his mind, a prime reason why they should not remain so. If Parliament had degenerated into a collection of "national dustmen," confusing people's vision instead of clarifying issues, then Parliament must be reformed,—and he said so in "Hard Times." If the Civil Service had become a "circumlocution office" so bound in red tape that it could do nothing, then the

Civil Service must be reformed,—and he said so in “*Little Dorrit*.” If the Court of Chancery served only to delay and thwart justice, then the Court of Chancery must be abolished,—and he said so in “*Bleak House*.” If the Poor Laws permitted fraud and graft and cruelty, then the Poor Laws must be amended,—and he said so in “*Oliver Twist*.” If the prisons of England were an outrage to humanity, then England’s prison system must be changed,—and he said so in “*Little Dorrit*” and “*David Copperfield*.” If there was in England a system of education which permitted cruelty to children, it must be wiped out,—and he said so in “*Nicholas Nickleby*.”

And he said all this none the less fiercely and effectively because he laughed hilariously while saying it. That is his almost unique distinction in reformatory literature, that he was in equal parts humanist and humorist. He incarnated the abuses of the English Poor Law system in Bumble, and Bumble would make a corpse laugh; of school cruelty in Squeers and Creakle; of the vicious public nursing system in Mrs. Gamp and Betsey Prig. England laughed herself weak over the pictures and then rose up and abolished the models. I am aware of no other reformer who got such apparently contrary results—wild laughter and a program fulfilled.

To my mind, the most interesting thing about the reform agitations of Dickens is that he got results, and the next most interesting thing is that he based his appeal on the very principles that are laid down by the scientific social workers of the twentieth century; namely, the interrelationships of society and the unnaturalness of social misery. These ideas permeate his works. The individual’s responsibility to society and society’s responsibility for the individual are, of course, the bed-rock of social endeavor. But twentieth-century scientific relief workers are equally insistent on the sec-

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ond idea—the abnormality of misery. Dr. Scott Nearing, in his book “Social Adjustment,” defines “adjustment” as “approximation to the normal,” and says:

“The methods of securing adjustment . . . differ in many ways, but upon one thing they are in accord,—they aim to remove *maladjustment*, to establish *normal conditions* of life and work, and thus to provide universal opportunity. Whatever else may be said of these methods, they unite in their ultimate end,—normality.” And Dr. Edward T. Devine, in his “Social Forces,” says:

“The principle that our goal is a *normal* community has greater significance than has yet been appreciated.”

It is interesting that the intuitions and sympathies of Dickens led him to conclusions identical with the principles that govern the modern scientific investigators: that society is a compact unit, that misery is abnormal and due to maladjustment, that therefore social ills are curable, that the children need first attention, that the battle can be won,—these are the concepts of twentieth-century science and of the Mid-Victorian novelist.

Fully to understand the significance of these things in the writings of Dickens, we must go back in imagination to the early years of Queen Victoria's reign. Notwithstanding all the reform afoot, other Englishmen of letters had not grasped these cardinal principles, simple as they now seem. Carlyle, student of history, sympathized with social misery, but advised a return to a foregone and abandoned paternalism, when all history taught the impossibility of turning back. But Dickens, who knew little history, knew better. Browning had a sentimental notion about the unity of society, but left it to the sentimental Dickens to show the practical bearings of the idea. Tennyson, the philosopher, felt the chill of the new science of evolution benumbing effort, but left it

to the unphilosophical Dickens to show that two can play at the game of environment; that if environment makes man, man can turn about and make environment. Scholar Thackeray pleaded for charitable judgment of mistaken men, but unlearned Dickens demanded charitable doing for suffering men. I really believe that Dickens read the signs of the times more truly than any of his contemporaries. He stands as the living tissue between the hot-headed dreamers who made the eighteenth-century French Revolution and the cool, practical workers of the twentieth century who are making the world more habitable. His intuitions taught him more practical lessons than Carlyle's libraries taught Carlyle.

And it was instinct married to experience which led his attention first of all to children. He had lived through the woes of a neglected and impoverished childhood, and in the happiest period of his maturity he could never think without a shudder of the days in the blacking warehouse and in the Marshalsea Prison, where his father was held for debt. But who knows what's best for us? Unconsciously and in silence he was storing up impressions for the work that was to come,—not only to excite pity for unhappy children but a passion to make them happy. Possibly the way he kills off his youngsters is not the highest art, but the way he pleads for them to be kept alive is the highest humanity. Is it exaggeration to say that all this modern activity for child welfare is in an indirect way a monument to the man who roused vast pity for unfortunate children and stung the public into caring for them?

But with all his modernity, Dickens had but limited sympathy with that modern thing known as organization. Formal organization was new in his time, and there were enthusiasts who regarded organization as an end and object in itself. Not all of those enthusiasts are dead, either. Mrs.

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Jellyby, in "Bleak House," was Dickens's caricature of the woman who has gone organization-mad, her life a debauch of correspondence, committees, and appointments, with the only result a neglected and sullen family. Coketown in "Hard Times" is as organized as a department store, with societies for the promotion or prevention of all conceivable things, but the first promote only what should be prevented, and the second prevent only what should be promoted.

In these complex times organized charity is as necessary as charity, but Dickens did not understand this in all of its implications, for in some things he remained primitive. He understood the new idea of communal interests, but not its corollary, that communal interests sometimes require the suppression of charity. Therefore he was violent against England's revised Poor Laws, designed to check needless pauperism, but which seemed to him to check mercy. Modern sociology emphasizes the individual's obligations to society, but Dickens emphasized society's obligations to the individual; and when an organization intervened between the individual's need and society's mercy, Dickens grew violent.

He never fully understood how modern social conditions have complicated the problem of charity, but he did understand a pinched face, the index to a pinched stomach,—for he had felt that pinch himself. He could not see how a hungry stomach offered one problem in Jerusalem in the first century and another problem in London in the nineteenth century, or that a hungry stomach by itself is one problem, and a hungry stomach with a thousand others offers an entirely different kind of problem. Every stomach knoweth its own needs. Society may grow complex, but the stomach remains primitive. So if a hungry boy came into conflict with a system, Dickens was on the side of the boy; that was

Oliver Twist's case, and all the world knows where the sympathies of Dickens lay in that famous controversy. Law and the dietary said one thing, and Oliver's stomach said another thing, and Dickens believed that Oliver's stomach was more authoritative than the law.

I believe that Dr. Devine and Miss Jane Addams would agree that, though the Dickens sentiment unrestrained is dangerous to social welfare, it is still necessary as a corrective to science. In "Twenty Years at Hull House" Miss Addams writes something pertinent to this, something very notable from one of her practical experience:

"The one thing to be dreaded in the Settlement is that it lose its flexibility, its power of quick adaptation, its readiness to change its methods as its environment may demand. It must be open to conviction and must have a deep and abiding sense of tolerance. It should demand of its residents a scientific patience in the accumulation of facts, and the steady holding of their sympathies as one of the best instruments for that accumulation."

Miss Addams has here stated the social workers' problem, which should enlist all that one has of "fortitude and delicacy." It is the problem of acquiring science without relaxing sympathy. The virtues of modern charity are many, and some of them stern virtues, but it is still true that the greatest of these is—charity. Dickens had that to an excessive degree. If he were alive and could study the problem in the light of the discoveries made by hard-working, humane, scientific people, he would in all likelihood modify his views of organization and system. If he would not, he would be wrong. But if the organization ever finds itself hardening into routine, indifference, and stony heart, the leaders would do well to reread Dickens.

The laughter of Dickens was natural because he believed

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he was engaged in a winning fight. And as time goes on it proves to be a winning fight. One by one, the things against which he stormed and jeered have been abolished or improved: infamously mismanaged schools, worse workhouses, the grinding of children to powder in work they should not do, inhuman treatment of those merely suspected of wrongdoing, the barbarities of prisons, the delays of justice in courts of law, the indifference of capital to employees, the maddening slowness of governmental procedure. He had his part in bringing about improvement in these things; he stimulated the sentiment which led to the thought which resulted in action. And so he had the joy of the optimist who is occupied with something which he believes can be accomplished.

His was the optimism of a man who is concerned with evils that can be remedied, the optimism of one who sees man as a social animal, not as a spiritual entity. He was preoccupied with the things that Dr. Devine had in mind when he wrote his very suggestive book, "Misery and Its Causes." At the outset Dr. Devine states that social relief has to do with a special sort of misery, that which is "traceable to preventable disease and accident, to loss of employment and a low standard of living, to intemperance and vice and crime, to ignorance and inefficiency." These are social ills; it was with these that Dickens was primarily concerned, and he was happy because he believed there was a remedy if society could be sufficiently aroused to seek it. But Dr. Devine catalogues another class of ills with which his inquiry is not concerned, and which social endeavor does not undertake to correct: "remorse over some past misconduct, the total failure of some high ambition, disappointment in love, the loneliness which comes from the inability to make friends, the silent anguish of a parent's broken heart."

These are things that belong to the spirit, the things which Dickens handled less skilfully than social ills, the things which George Eliot handled best of all, though she too was interested in the problem of the poor. Dickens was best in exposing the evil which is social in its origin and therefore subject to alleviations by social change; George Eliot was best in that occult region where the human soul makes, un-makes, and remakes itself. Dickens is most effective when he is summoning society to help what society can reach; George Eliot is most impressive when she reveals what only the long arm of God can reach. Dickens is best as a social philosopher; George Eliot, as a moral philosopher.

Dickens was impatient of all evil, and aggressive to cure it. Because he was so, he rendered more service to the cause of actual reform than any other novelist of his time and nation. But because he was so, he unconsciously falsified some things—those things that belong to the depth and loneliness of the individual spirit, things beyond the influence of social effort and changed environment.

The optimism of Dickens comes from without, but the deepest and most far-reaching optimism comes from within. There is an inward power of recuperation which is indifferent to environment, superior to it. That was what George Eliot showed, what Dickens did not show. Samuel Butler, in "The Way of All Flesh," a book so good that it should have been better, says:

"All our lives long, every day and every hour, we are engaged in the process of accommodating our changed and unchanged selves to changed and unchanged surroundings; living, in fact, is nothing else than this process of accommodation."

This process of accommodation is just what we find in George Eliot's novels, and just what we miss in the novels

of Dickens. Dora must die conveniently and give David Copperfield another chance for happiness—with his Agnes. But Romola does not remarry. She readapts herself to new conditions and finds inward peace.

When the devil has done his worst,—and his worst is pretty bad,—there is yet power of reaccommodation and recuperation for the brave heart and willing mind. In bereavement there is a law of compensation when the bereaved begins to think less of what he has lost and more of what he has had. It is by this process that Tennyson recovers himself in the “In Memoriam.”

I walked with an old man whose wife was dying. Because I knew how he loved her I was astonished at his cheerfulness until he illuminated my understanding with one simple remark. He said, “I am losing her now, but I have had her for forty years, and that’s what counts.” Then I suddenly understood the problem of life’s mathematics whereby we make our possessions consist in what we wisely spend and not in what we save. To the dying woman the old man had given all, and in return had got what nothing could ever take away,—

“Not time that sayeth and gainsayeth,
Nor wrath of gods nor wisdom of men,
Nor all things earthly nor all divine,
Nor joy nor sorrow nor life nor death.”

He could face the future fearlessly because the past was safe. Suppose his was a special case, a rarer spirituality than usual,—and it was so,—still for others in time, if not in the first rending, readjustment comes where there is the willing mind. That is life, not changing the environment, but reaccommodating the spirit to the altered conditions.

It was splendid of Dickens to insist so boldly on that adjustment which is possible by altering social conditions, but it was his weakness to insist on applying the same principle in the region of the spirit, to assume that by rewarding all his good people and punishing all his bad people, by setting up all the good people in cozy worldly comfort at the end of the novel and banishing the bad people or putting them in jail, he had solved the problem of evil. The Dickens prescription is too simple: Are people unhappy in England? Then send them to Australia. Are people unhappily married? Then kill off their partners and remarry them to more congenial people. Make the good people happy and the bad people wretched at the end of the book, and there you are! Who calls this a complicated world? It is a very good world when an "optimistic" novelist is put in charge of it.

The valor and beauty of life sometimes consist in bearing bravely and cheerfully what can't be cured. The truest optimist is he who *wills* happiness, let the conditions be what they may. He is not necessarily an optimist who goes to a dinner and is happy because the meats agree with him. He is an optimist who is happy when the meats disagree with him. The seat of optimism is deeper than the digestive organs.

Just as stories, I am glad that his novels generally end happily,—the bad people punished and the good people rewarded. Personally I seem to have outgrown my taste for fictitious tragedy. I suppose that is a common experience,—as we grow older we become so horribly aware of life's sufficiency of actual tragedy. When I go to the theater now I want to see them all paired off before the curtain drops, and I don't want a messenger to come in and tell about it either. I want to see it with my own eyes. So in

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reading the novels of Dickens it is comfortable to know that everything is coming out right in the end: David and Oliver and Nicholas will be happy when we bid them good-by. But I know that this crashing full orchestral finale is not quite like life itself. The quieter, less completely satisfying endings of Thackeray and George Eliot are nearer the truth.

But this mistake that Dickens made was just a part of his bigness, and his faith that what right-thinking men would do right-willing men can do. His two leading traits of character were aggressiveness and impatience of delay; he wanted to do things, and he wanted to do them at once; and he wanted society to do things, and at once. He had impatient contempt for men who called that "fate" which is only inertia or insensibility to the sufferings of others. He knew that they who most frequently prate of "destiny" are those who are too feeble in will to make an effort, and those who profit from the suppression of others. He knew that much which society calls incurable is quite curable if society will bestir itself. He was generous and wanted everybody to have the remedy, and from society itself. So he stormed, derided, satirized, laughed, and fought; and so he got results where results were possible. In this world's economies some are always praying in the secret mountain-top and some are always fighting in the plain; Dickens was always with the fighters and at the front.

"Then said his Lordship, 'Well, God mend all!'—'Nay, by God, Donald, we must help him to mend it!' said the other."

THACKERAY THE SATIRIST

THACKERAY is not an easy author to expound, because of a curious mixture in him of simplicity and subtlety. On the surface, nothing could be simpler than a novel by Thackeray, but when we inquire into his secret, that which has made him famous, made him loved, we are evaded and baffled. I meet people who do not like Thackeray. I find there is no arguing the case; he is the least demonstrable of the authors. If a person does not like Browning, I shall probably not be able to make him like Browning, for we cannot argue people into feeling anything; but I can at least show him why I like Browning. I find it hard to show dissenters why I like Thackeray.

Suppose a person says that Thackeray's plots are slight, his philosophy thin, his sentiment sloppy, his cynicism cheap, his motivation superficial,—what are we to answer? Well, of course, we can say that the man has a very disagreeable way of stating the matter. But suppose he asks if the charge, when made more politely, is unjust,—can we honestly answer, "Yes"? If I am then asked why, in spite of all this, I like Thackeray, I suppose I must reply, "Because he is Thackeray"—a not very convincing reason.

In literature, as in life, it sometimes happens that we have a deep and personal affection for some one out of all proportion to his talents or his virtues. Charles Lamb is a notable example. His writing is the expression of a personality which attracts and compels love. Thackeray has some of this same magnetism. One sometimes disapproves of what he says and wearies of his mannerisms, but the man himself, as expressed in his writings, is charming. And that is the

word which above all others applies to Thackeray and his writings,—charm. It was the quality which he found in Dick Steele, and which made him love poor reckless, faulty, falling Dick. Thackeray is seldom in a happier vein than when writing of Dick, whether as a fictitious character in a novel or as the historical subject of an essay. I take a passage from that same essay, which expresses what I am trying to say about Thackeray: "If Steele is not our friend, he is nothing. He is by no means the most brilliant of wits nor the deepest of thinkers; we love him as children love their love, with an A because he is amiable." We might play the old childhood game with Thackeray and say we love him with a C because he is charming, and "if he is not our friend, he is nothing."

So far as anything so intangible can be explained, it must be explained by Thackeray's intimate and informal manner. He takes us into his confidence. He seems to be talking to us in the most personal and intimate way. He loves the personal pronoun "you," the pronoun of direct address. The literary art of a man like Thackeray is the art of raising conversation to the highest potential, and conversation means letting the thought flow where it will. There are people who never converse, but talk. They talk at us, over us, to us, never with us; they harangue, soliloquize, declaim, argue like lawyers, dissect like doctors, dogmatize like pedagogues; you assent, dissent, query, comply; you try to get away from the topic, but are jerked back like a calf on a rope; your eye pleads for mercy, but you get none; your mind wanders to pleasant pastures and still waters, but you are called to attention like a raw recruit by an angry drill-sergeant; when at last it ends, you murmur, "Thank God, that's over!" Then you talk with the real conversationalist; your minds meet and merge as easily as currents of air; you

pass lightly from subject to subject, grave and gay, sense and nonsense, trivial and weighty,—it all mingles like many tributaries in an unimpeded stream. It is as natural as breathing, and as unforced.

So it is with Thackeray. He sits down to that perfect talk of his, and stories and characters “just grow” in the most unobtrusive, haphazard way. He is the least methodical of the great novelists. If no novel can be great without unity and coherence of plot, then Thackeray’s novels are assuredly not great. But a perfect plot does not of itself insure perfect literary art. It would be difficult to find better plot-making than the old nursery rhyme:

“The King of France went up a hill
With twenty thousand men;
The King of France came down that hill
And ne’er went up again.”

There is plot structure! There is unity, rising action, climax, falling action, catastrophe. It is safe to say that few plays produced this season have been so close-woven in plot as that; yet it leaves something to be desired. Thackeray supplies the something—a personality.

Consider, for instance, the opening of “The Newcomes.” First there is a fable of crows, frogs, oxen, foxes, lambs, and wolves, related in the vernacular with a quiet smile; then a discussion of critics and authors; then half-satiric praise of the “good old days” when he was young and ate late Welsh rabbit, and drank brandy and water, and sang gleeful songs at the inn called the Cave of Harmony; then into the Cave of Harmony comes a sun-browned, lean military gentleman, leading a lad. They are Colonel Newcome and his son Clive. The story has begun, but so casually, so conversa-

tionally, that you scarcely know it has begun. You wonder if he knows how he is going to carry it on. He does n't. In this same story he kills an old lady in one chapter, and, forgetting this, he has her alive and blithely active in a subsequent chapter, and then he laughs at his own blunder. He was once asked why Becky Sharp behaved in a certain way, and he answered, "*Don't ask me; Becky is too much for me.*" It is all negligent and perfect conversation. A critic has defined Thackeray's quality as "urbane negligence." It is a happy phrase.

The perfect conversationalist is generally a man who will say many true things and wise things and witty things, but hardly the profoundest things. Profundity and conversational ease do not go well together. Profundity belongs to some more formal method,—for instance, to George Eliot's analytical method. Thackeray was a wise man in the mellow, worldly sense of the term. He was not a deep thinker, nor was he particularly interested in the deeper thoughts of his generation. He was the one great Victorian writer who seemed to be untouched by the prevailing national and philosophical modes of thought. The air was surcharged with big and sometimes disconcerting ideas, and nearly all the other novelists and poets and essayists were inspired or disturbed by these ideas. If all other record of the century were wiped out, the future historian could reconstruct the century in outline by reading Dickens, George Eliot, Ruskin, Tennyson, Browning, and Arnold. But from Thackeray he would learn little about the political, economic, scientific, philosophical, and religious life of the century, though he would learn much about the social life, and much about Thackeray himself.

In "The Newcomes" we read how young Clive Newcome sailed away from India and his papa to England and his

aunts; it is biographical, with this difference, that it was Clive's mother who died in India, but Thackeray's father. Mrs. Thackeray was to take for her second husband Major Carmichael Smyth, who was destined to be immortalized by his stepson as Colonel Newcome. Then Thackeray took up the tale of his boyhood in "Pendennis," wherein his own famous school, Charterhouse, becomes Greyfriars; his real home, Ottery St. Mary, becomes Clavering St. Mary; and his real university, Cambridge, becomes Oxbridge. Of course we understand that he mingles much pure fiction with his recollections of himself, but at Trinity College, Cambridge, Thackeray's career was not unlike Pen's, a liberal interpretation of his obligations to the curriculum, a more liberal expenditure of time and money in social diversion, a good deal of miscellaneous reading, some sketching, and some writing, especially for "The Snob," an undergraduate publication.

In the Sketches and Burlesques we hear of the Court of Pumpnickel, and its oddities arose from memories of his own travels in Germany after leaving Cambridge, and particularly of his residence at Weimar, where he met the aged Goethe. It was Paris rather than Weimar that was destined to be the foreign city of his love, and his object in going to Paris was the familiar one of art study. He had been a university man and a student of law like Pendennis, and now he will be a student of art like Clive Newcome. He had always loved to sketch, and after he had become sufficiently disgusted with law he decided that drawing was "the one thing he could do." Of course we know that it was the one thing he could not do in any accepted sense. Probably a worse draftsman never made famous pictures. It is not surprising that his application to illustrate Dickens's "Pickwick Papers" met with a refusal. And yet Thackeray's pictures

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are famous, and justly so. They violate most of the principles of technique, but get their effect notwithstanding, and in this way they may be regarded as a parable of his literary art.

While living in Paris, and as soon as he thought he could support a wife, he had married Miss Shawe, daughter of an Irish colonel. After four happy years Mrs. Thackeray fell ill. The malady was mental. There were two years of travel and nursing and suspense, two years more of hoping against hope, then the abandonment of all hope, and the doors of an asylum finally closed upon her. Thackeray's own words much later were, "Though my marriage was a wreck, I would do it over again; for, behold, love is the crown and completion of all earthly good."

As his home was now broken up, he sent his little girls to their grandparents in Paris until they should be old enough to do with only a man's care, and he, joining various clubs, took up the life and habits of a clubman, and his outlook on life became a clubman's. That is not said in condemnation, but neither is it said in commendation. Very excellent gentlemen are frequently habitual clubmen, but a club is not the best school for a novelist, nor the best place in which to observe life in its primitive and essential traits. The clubman is tempted to apply false standards to men, to judge them according to their clubs and the social register, not according to their manhood. He frequently lays more weight upon the accidents of life than upon its realities. He inclines to grow conventional, fastidious, a little snobbish, perhaps, and painfully punctilious about conduct which is prescribed by neither the moral law nor the civil law.

This is not intended as a portrait of Thackeray, but rather as a setting. He was a clubman who had known a home, and had known Bohemia, where conventionality is as much neg-

lected as it is overstressed in clubdom. He was a chastened and a broadened clubman. But he did get a good deal of the clubman's attitude, did view the world too often from the club windows, noted the stranger leaning on Lord Fuddlestone's arm and wondered why, perceived the unfamiliar face in the Marquis of Steyne's carriage and wondered who, observed that Mr. Deuce-ace's coat was getting shabby and smiled a little ironically.

No one has anatomized snobs more cunningly, but the "Book of Snobs" bore on its title-page the statement that it was written "by One of Themselves," and there was more than a jest in the pseudonym. Thackeray is said to have remarked that he was a snob. Certainly we who love him would not go so far as that, but it is true that he understood the breed better because of an instinctive familiarity with their point of view. Perhaps it is only natural to be more interested in a man if he has a title than if he is plain "Mr."; at any rate, with Thackeray it was extremely natural. Some one has remarked that Mr. Alexander Pope had a great deal of human nature in himself; in his attitude toward worldly place Mr. Thackeray had in himself an excess of human nature. You note with what gusto he traces the family relationships of many of his heroes, frequently with gentle mockery for satirical purposes; but he knew—none better—that his satiric shots had found a vulnerable spot in his own bosom.

Thackeray's satire is not the satire of a man who hated the thing he was talking about; had he hated it cordially, there were plenty of roads of escape. His friend Tennyson disliked society and had no trouble in keeping away from it in Surrey and the Isle of Wight. His friend Edward Fitzgerald hated it and made himself comfortable at Woodbridge, where it never came. But Thackeray did not try to

escape. He loved Belgravia and Mayfair, however much he satirized them.

So it comes about that this great man has little to say about the things that are eternal, much to say of the things of a season. A good deal of the difficulty with which his characters have to contend is money difficulty. The heroic and tragic books in literature are not usually woven out of the money motive. Of course, Thackeray was not trying for big effects. Over and over again he protests that there is nothing heroic in his novels, least of all the "heroes"; but that is just the point I am making—that he does overlook the large things, the primal things, the fundamental things. It must be admitted, however, that he has a sort of magic in making the worldly things interesting, and that the tone of worldliness is much softened by the great heart which beat in this big man's bosom,—the real and unaffected regard which he had for simple goodness.

The tone of melancholy seems to grow out of the fact that he sees simple goodness overcrusted so often with worldliness. My only criticism is that he would have found it less overcrusted out of clubdom and out of Belgravia. Nor is this meant to say that the people living in Thackeray's world were any worse than those who lived out of it, but it is meant to say that the people outside of the fashionable set with which he was so familiar did not offend in that special way which caused him so much pain, did not sacrifice everything for worldly place, did not sell their daughters to the highest bidder, did not wear themselves out with trying to appear something other than what they were.

Because Thackeray dwelt so exclusively on the social side of men's lives and laughed so satirically at their foibles, he was called a satirist as soon as he began to be read in England. And he immediately earned the reputation of being a

cynical satirist because people insisted on contrasting him with Dickens. Dickens was also a satirist, but obviously he was no cynic. When "Vanity Fair" appeared Dickens had already become famous. "Vanity Fair" made it clear that another great novelist had entered the lists, and readers, ranging from the most intelligent, like Mrs. Carlyle, to the most shallow, fell to making comparisons.

(One of the patent points of contrast lay in the fact that Dickens painted human nature in bold primary colors and high lights, while Thackeray painted it in neutral drab. Dickens passionately loved his good characters and passionately hated his mean ones. But Thackeray laughed at his own characters, and painted faults in the good ones and virtues in the bad ones, with the result that human nature in his books was reduced to a common level. There were no absolute heroes and few absolute villains, and at the end of the story the good people were but moderately rewarded and the bad were inadequately punished.)

It was consoling to find in the pages of Dickens that virtue brings happiness right here in this world, but Thackeray not only left the good people imperfectly happy, he even averred over and over again that complete happiness is impossible. Did not that very novel "Vanity Fair" conclude with this discouraging sentiment: "Ah! Vanitas Vanitatum! which of us is happy in this world? which of us has his desire? or, having it, is satisfied?" And did not much of the moralizing in the book run to this same tune?

And what a state of affairs there is at the end of this all-important "Vanity Fair"! There was pious Amelia Sedley, who married George Osborne and loved him with the dumb worship of an Oriental devotee, while George was bored by her and trifled with other women, and even when he bade her good-by before going to fight at Waterloo, came

out of the room murmuring, "Thank heaven, that is over"; and then George got killed and poor Amelia worshiped his canonized memory, and all the time Colonel Dobbin, who had always loved her, was hovering about her, trying to make her a little happier, and Amelia was piously inhibiting the idea of happiness with poor George dead and in his grave and his sainted spirit looking down on her from above; until after many years Mrs. Rawdon Crawley tells her that she is "a fool" and that her precious dead husband was a "selfish humbug" and a "low-bred cockney dandy," and had tried to get her, Mrs. Crawley, to elope with him, and, to prove it, shows poor Amelia the very note in which George had made this amiable proposition, a note written on the very day of his death and passed to prudent Mrs. Crawley under his wife's nose. So with a clear conscience Amelia marries Dobbin (and Thackeray does not refrain from telling us that she found it rather a relief to be released from her duty to the dead man in order that she might marry the living), and as time goes by and the Dobbins have a little girl, Amelia sighs as she thinks she perceives that the devoted Dobbin is fonder of the child than he is of her,—even he, patient, long-suffering Dobbin! And the best that Thackeray can tell us is: "But he never said a word to Amelia that was not kind and gentle, or thought of a want of hers that he did not try to gratify." And that is the end of pious Amelia's story.

In the same novel is wicked Becky Sharp, whose minor adventures were much too numerous for summarization, but whose chief escapades included an elopement with that notorious rake Captain Rawdon Crawley, and a sad repentance when she found that if she had only waited a little longer she might have married Sir Pitt Crawley himself; and then a disgraceful affair with Lord Steyne, so that her hus-

band had to leave her; and then a shabby-genteel life of travel over Europe with huge, gross Joe Sedley, who frittered away his property and died so mysteriously that there had to be an investigation, but nothing was proved, though the judge said it was one of the darkest cases that had ever come before him; and Becky got the insurance money and went to live at Bath, where "a very strong party of excellent people consider her a most injured woman." Here she devotes her life "to works of piety"; "she goes to church,"—and Thackeray adds, "never without a footman," as if that were an embellishment of piety. "Her name is on all the Charity Lists. The destitute Orange-girl, the neglected Washerwoman, the distressed Muffin-man find in her a fast and generous friend. She is always having stalls at Fancy Fairs for the benefit of these hapless beings." And that is the end of wicked Becky Sharp's story.

When the tale is told, is pious Amelia much better off than wicked Becky? Neither is really happy. What advantage hath the righteous in such a scheme as this? We know how differently Dickens would have handled these lives, what delirium of happiness there would have been for Amelia, what depth below depth of disgrace and misery for Becky.

So people deduced the inference that Dickens thoroughly believed in human goodness and its triumph on earth, and therefore he was an optimist; while Thackeray did not thoroughly believe in human goodness and its earthly reward, and therefore he was a cynic. It was this contrast which at the outset went far toward giving Thackeray a bad name. To-day the most careless reader of Thackeray, with the contrast no longer so sharply in mind, penetrates the veneer of cynicism and exposes Thackeray's tender humanity, which lies just below the surface. We compare him with Dean Swift, the real cynic and satirist, the bitter

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despiser of mankind, and realize that, by this standard of misanthropy, Thackeray was a very superficial cynic. Furthermore, we realize that underneath the tone of mockery there is a sentimentalism as incorrigible as Dickens's own. Thackeray loved humanity and the simple virtues as much as Dickens. But he was more of a realist than Dickens. He could not so cheerfully and confidently divide mankind into good and bad. He was too much impressed with the way in which qualities blend in actual life.

The real point of it all lies in this, that Thackeray loved humanity so deeply that he was grieved to see how much of its frailty and transgressions are chargeable to society and its standards and exactions. Thackeray instinctively thought of men and women in their social relationships, and he found that these relationships, while necessary, entail much misery. It was not so much with basic human nature that Thackeray worked, as with human nature modified by society. Being a very truthful person, he was unwilling to fling over life a drapery of illusion with which life had never provided itself. He was not a philosopher in the metaphysical sense in which George Eliot and Browning were philosophers, was not trying to look behind appearances at ultimate realities. It was his habit of mind to think most about life as it actually exists here on earth, and for the comparative unsatisfactoriness of life he held society largely responsible. This, I take it, is the underlying philosophy of the characteristic satiric tone in the novels of Thackeray.

This satire, as he drew it, was marked by two constant aims: his desire to depict the average man and his desire to show the truth. He was capable of large enthusiasms for superior men, and was as much a hero-worshiper of Nelson or the Duke of Wellington as most Englishmen of his time. But superior men are rare, and, because of their greater

number, Thackeray felt that the average men are more important in literature. Besides, he disliked "heroes" in fiction because they were associated with the highly romantic style of novel, for which he never cared. He, who knew so much of eighteenth-century literature, was unaffected by the far-reaching romantic movement of that century. He loved the writers who depicted daily life and daily manners. His first great novel, "Vanity Fair," had for its subtitle, "A Novel without a Hero," and he closed "Pendennis" with the statement that Arthur Pendennis "does not claim to be a hero, but only a man and a brother."

In portraying the average man, Thackeray aimed to be as truthful as possible. Love of truth was one of his cardinal traits,—not truth in the philosophic sense of the ultimate, but simply fidelity to the actualities of the world. He preferred showing things as they are to idealizing them into something better than they are. He had the plain Englishman's respect for the facts of things, and a feeling—also very English—that to the truth he owed loyalty. This is his attitude in all his works, but is perhaps most explicit in "Pendennis." In the preface to this novel he says: "I ask you to believe that this person writing strives to tell the truth. If there is not that, there is nothing."

That is the Thackeray attitude. It is the attitude which says in effect: Take care of the truth, and morality will take care of itself. Is it wrong to let a man gamble and drink too much and play fast and loose with social standards, and yet permit him to remain lovable—like my Lord Castlewood? Is it wrong to let a man gamble and drink too much and be rough and brutal, and yet so thoroughly manly that we must admire him—like Captain Rawdon Crawley? Does not morality demand that these people be made hateful and contemptible in books? Thackeray's answer would be, Are

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they always hateful and contemptible in actual life? and is it not immoral to tell lies? I heard a preacher say that loose-living men are always cowards, and then I remembered the soldiers who followed the Duke of Marlborough into battle, and, frankly, I think the preacher was less moral than Mr. Thackeray.

The worst of it is that boys so quickly find the falsehood in these forced morals. Nobody insisted more on the beauty of virtue than Thackeray, but he could not feel that he enhanced the beauty of virtue by telling lies about it. And the plain truth is that sometimes very bad men have some very endearing qualities. The wickedest boy in the town that I grew up in was the bravest, and the way to make the other boys good was not to deny that obvious and much-admired courage. So there are some truths which sound cynical when merely stated, and these happened to be among the truths which impressed Thackeray.

There is no danger in this view, if we will understand our own thoughts and discriminations. Thackeray did not confuse good and evil. He understood—none clearer—that good is good and evil is evil, and that the two can never shift identities this side eternity. What he could not see nor say was, that some men monopolize all the good, and other men monopolize all the evil. He had the absolute hatred of sin which every man, sobered and saddened by experience and observation, must have. But because he hated sin he did not therefore hate sinners; that would seem to him like universal hatred, for “there is none righteous; no, not one,” says the Scripture explicitly, says Thackeray in effect. To hate sin and love the sinner is simple Christianity—that is all.

Thackeray added to his apparent cynicism by taking a Back-stairs View of life, by lingering over those intimate and minor personal details which the heroic romancers sel-

dom observed. Love and great deeds! Those were the themes of the old romancers. But it interested Thackeray to know what the hero was doing in the interim of the great deeds, and when love had ceased to be a fever and become the sweet and quiet habit of a life. How much of even a great career is made up of romantic events? If we could state the ratio in mathematics, it would be startlingly small, and in the life of the average man appallingly small. More than one-third of life is spent in sleep, our heads, as Carlyle says, "full of the foolishhest dreams," and an eighth of the remainder is occupied with giving a human imitation of a dumbwaiter, passing food to that insatiable fellow that dwells under the waistband. From fifteen to twenty years, at the beginning of life, are spent in getting ready to do something; five, ten, or fifteen years, at the close, are spent in resting after doing it. The nominal period of great deeds is short, and the actual period much shorter.

Thackeray knew that the knight himself spent only a moiety of his time in knightliness, in rescuing fair and distressed maidens from embarrassing circumstances. Much of the while, the knight was foraging for his horse and himself, dickering with the blacksmith, quarreling with the armorer, disputing the price of a night's lodging, digesting his food and drink. It was doubtless because the romancers overlooked these homely realities that Thackeray did not care for romances,—one regrets to say not even for so fine a romance as "The Bride of Lammermoor." He said, "I have never cared for the Master of Ravenswood or fetched his hat out of the water since he dropped it there when I last met him (*circa* 1825)."

It was every-day life, with its every-day incidents, only occasionally varied by something tense, terrible, or beautiful, which absorbed Thackeray. By way of parenthesis let me

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observe that this modification, "occasionally varied," is important. Thackeray, like Balzac, like all great realists, understood that life, though usually commonplace, is occasionally dramatic. The longer stretches of life are on a low and level plain, but somewhere in the shadows, for nearly everybody, there is lurking the "moment." These tense moments are as essential to the truth of life as are the longer periods of its ordinary courses. This point is sometimes missed by realists a little less great than the greatest,—even by admirable Mr. Arnold Bennett himself; they are so anxious to tell only the truth that they are afraid of the whole truth. Thackeray and Balzac did not shun the dramatic moments, for they knew that these are a part of the truth. But in the nature of the case, the realist must give up more of his novel to the ordinary than to the exception, and the ordinary which most appealed to Thackeray was the intimate personal life of the family.

And so I call his novels a Back-stairs View of life. You don't know the family from the front-stairs view, the reception-room and company manners. The family's history lies back of the drawing-room. This does not necessarily mean that there are skeletons in the closet—though there generally is a skeleton in the closet of a family of which Thackeray writes the fictitious annals; what it chiefly means is that the intimate and personal life of the individual or the family is not the life that is paraded on the avenue. And it means that Thackeray is not content to show you his creatures on parade. He takes you into his confidence and tells you all about their private affairs. That is why we seem to know the Thackeray folk better than we know the people of, say, Scott's novels.

The satire of Thackeray, then, is just that darker shading to the truth of life as he saw it. With calm and steadfast

eyes and with the most tolerant of spirits, he looked the world in the face, saw littleness mingled with all greatness, goodness mixed with all meanness, good fortune and ill fortune chemically combined, and dispassionately recorded what he saw. And this satire of his, because it was written without reformatory purpose, because it was written without malice, because, above all, it was written by a great-hearted gentleman, is so broad, so mellow, so genial, so urbane, that it renders trivial most subsequent English social satire, with its smart talk, its forced epigram, and its shrill propaganda.

Not less than his love of truth was his charity. It was as broad as humanity. It was to him an absolutely necessary virtue in a world as complicated as this. There is no other working system among the sons of men than charity toward all. This is the obverse side of the Thackeray satire. It is impossible to see Thackeray whole if we see him only as a satirist. Indeed, one is not sure that the philosophy of Thackeray can be stated at all in terms of satire. One is rather inclined to think that the philosophy of Thackeray can be stated only in terms of charity. So simple is that philosophy that it may almost be summed up in the petition, "Forgive us our debts, as we forgive our debtors."

Probably America can never have so comprehensive a satirist as Thackeray. America is too big and varied for any one city to concentrate its qualities as London concentrated English society in the days of Thackeray. A satiric picture of New York would not be a satiric picture of San Francisco. It is more likely that each great social center will produce its own satirist. If he is to be as great as Thackeray, he must be not only as keen and caustic; he must also be as large of nature, as broad in sympathies, as able to laugh with poor old humanity as to laugh at it.

GEORGE ELIOT AND PERSONAL RESPONSIBILITY

GEORGE ELIOT, who was remarkably diffident for a person of great genius, was thirty-seven years old when she wrote her first fiction, and even then only at the peremptory command of George Henry Lewes. She did not believe that she had the proper sort of talent for novel-writing. Her self-distrust was a specific doubt,—that is to say, she knew she had enough intelligence, but she did not believe that she had the right sort of talent for novel-writing. She was already a literary person; had translated a work which assisted in making an intellectual epoch, a sad epoch,—Strauss's "Life of Jesus"; had translated other German works; had written magazine articles, literary and philosophical; had been one of the editors of the "Westminster Review," an important philosophical radical magazine; had been the respected companion of many of the conspicuous literary men in London.

She could not doubt that she was a woman of unusual intelligence, but she was a woman, and with all her independence in thought and life, the sort of woman that we call "womanly," a circumstance too often forgotten in assessing her astonishing powers. And so she was modest about her abilities, genuinely modest, and hesitant about beginning a new kind of work, or rather about beginning this particular kind of work, for she said that she was "deficient in dramatic power both of construction and dialogue."

She was, I think, correct in her premise, though wrong in her conclusion. She was really "deficient in dramatic power," but she has shown—few more conclusively—that a

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person may be deficient in dramatic power and yet a very great novelist. She was one of the four great British novelists of the nineteenth century, Scott, Thackeray, and Dickens being the other three. She was one of the five great English-speaking novelists of the century, Hawthorne being the fifth. Each of these had his great merits, but also his deficiencies, and George Eliot's deficiency lay precisely where she thought it lay—in dramatic power. She has portrayed human nature with great power, but that power is not dramatic.

To portray human nature is the chief object of the dramatist and the novelist, but they do it in different ways. The dramatist puts his characters on the stage to speak and act for themselves. The audience or critic must explain why the characters act as they do. An interesting example of the dramatic way is in the plays of Ibsen. We know that Ibsen wrote many of his dramas from a definite philosophical point of view, but he was so much the dramatist that he has left to the audience and critic an almost limitless region for debate, for different interpretations of what was perfectly clear and defined in Ibsen's mind, but which he was too much the artist and dramatist to state in abstract, defined, and dogmatic fashion. The novelist combines in himself the functions of creator and critic. He tells what the characters do and say by narrative and dialogue, but he also explains them by comment. According to the proportion of critical comment to dramatic dialogue, we call a writer "creative" or "analytical." George Eliot was a type of the analytical novelist, not content to tell what her characters do and say, but equally anxious to tell what they are. That is philosophical, for philosophy has to do with being, but it is not dramatic, which is concerned with doing.

George Eliot began with a manner less remorselessly

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analytical than the manner of her later novels. She began in what may be called a narrative-creative method, but developed more and more the analytical. "Adam Bede" belongs to her earlier period, "Romola" to her later period. In neither was she distinctly dramatic, but in the second more extremely analytical than in the first. Two passages from these novels will illustrate the distinction. Each passage shows a woman in sharp disillusionment with the man she loves. Each woman still loves the man, but is shocked and perplexed by his conduct. The first shows poor little Hetty after she has received the letter from Arthur Donnithorne telling her they can never marry because of social inequality. We are told what Hetty did, very little of what she felt. The narrative does just what a competent actress would do by gesture and posture and facial expression:

"Slowly Hetty had read this letter, and when she looked up from it there was the reflection of a blanched face in the old dim glass—a white marble face with rounded childish forms, but with something sadder than a child's pain in it. Hetty did not see the face—she saw nothing—she only felt that she was cold and sick and trembling. The letter shook and rustled in her hand. She laid it down. It was a horrible sensation—this cold and trembling: it swept away the very idea that produced it, and Hetty got up to reach a warm cloak from her clothes-press, wrapped it around her, and sat as if she were thinking of nothing but getting warm. Presently she took up the letter with a firmer hand and began to read it through again. The tears came this time—great rushing tears that blinded her and blotched the paper."

In the second passage Romola is beginning to see what Tito really is, and is trying not to see it—it is a way that women have. Here, it will be observed, the author takes her character to pieces, explains her state of mind, and ex-

plains it on a theory of universal human nature. First there is a general postulate, a basic human principle, and afterward an application of the principle to Romola herself:

"It belongs to every large nature, when it is not under the immediate power of some strong unquestioning emotion, to suspect itself and doubt the truth of its own impressions, conscious of possibilities beyond its horizon. And Romola was urged to doubt herself the more by the necessity of interpreting her disappointment in her life with Tito so as to satisfy at once her love and her pride. Disappointment? Yes, there was no other milder word that would tell the truth. Perhaps all women had to suffer the disappointment of ignorant hopes, if she only knew their experience. Still there had been something peculiar in her lot: her relation to her father had claimed unusual sacrifices from her husband. Tito had once thought his love would make those sacrifices easy; his love had not been great enough for that. She was not justified in resenting a self-delusion. No! resentment must not arise; all endurance seemed easy to Romola rather than a state of mind in which she would admit to herself that Tito acted unworthily."

The trouble with the analytical method is that it tends to substitute psychology for character-delineation, criticism for creation. And that was George Eliot's chief temptation. A very able psychologist may be a very poor novelist. The wife of an eminent psychologist, whose specialty was child psychology, observed that her husband knew a great deal about child psychology, but nothing at all about children. A psychologist may tell us all about the way the human mind works and yet be unable to explain the workings of John Smith's mind. The business of the dramatist is to show us, not the general laws of the human mind, but the specific qualities of John Smith's mind.

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One sometimes reads rather futile criticism based on the supposition that *a* man or *a* woman would not do thus and so, as the dramatist or novelist has represented. Who under the canopy can say what *a* man will not do? He will do anything, everything—has done all the things that have been done since human nature began. The proper question is, ~~Would~~ this particular man or this particular woman do this thing? The philosophical critic may declare that *a* woman would not go into a room where a man has just been murdered, cup up his blood in her hands and smear it over the faces of drunken men asleep in the chamber, in order that suspicion of murder may attach to them. The critic may be entirely correct in assuming that his mother, his wife, or his sister would not. For the sake of his own peace of mind and the prolongation of his life, it is to be hoped that he is correct. He certainly would be correct in saying that a gentle Ophelia would not. But he is certainly incorrect if he says that Lady Macbeth would not, for that is precisely what she did, and Shakespeare knew what he was about when he made her do it. This act is conformable to the character as it is set forth in her other acts and all her words. In short, the character of Lady Macbeth is sustained and consistent. But there is little question here of the general laws of psychology. The consistency grows out of the fact that when Shakespeare created Lady Macbeth, he did not stop to analyze human nature in general or Lady Macbeth in particular,—he *was* Lady Macbeth. When Shakespeare's imagination was really on fire with one of his great conceptions, that imagination was inerrant. He could have his moods of blundering and nodding like great Homer, like great everybody else who has undertaken to make literature; but when once a conception like that of Lady Macbeth had taken hold of him, his intuitions carried him infallibly to the right conclusion.

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I am not quite certain that George Eliot was inerrant. I am rather inclined to think that Sir Leslie Stephen was correct when he said that George Eliot erred when she allowed Maggie Tulliver to fall in love with Stephen Guest. Of course, girls have been known to fall in love with even greater coxcombs than Stephen; but if such a girl as Maggie is going to succumb, the paradox should be made more convincing than George Eliot has made it.

Because in her earlier books George Eliot was depending more upon her recollections of her girlhood and less upon her scientific observations of people, she was less minutely analytical than in her later works. In the earlier books, "Scenes of Clerical Life," "Adam Bede," "The Mill on the Floss," and "Silas Marner," George Eliot was drawing on her stores of memory, and recording scenes and people out of her childhood and girlhood recollections. That is an excellent recipe for good literature, to turn into books what we learned and saw when children. As we grow older we learn more things, but we learn them less intensely. Nothing is ever quite so vivid as the experiences of childhood. A man in his maturity may traverse the Seven Seas, but he will get no thrill like that which he had from the creek in which he learned to swim. He may hobnob with royalty, and play golf with prime ministers, but none will seem so great as the Fourth of July orator back in the home village. To the man of forty the world is a little place, but to the boy of eight the cow pasture is a universe.

George Eliot kept her early impressions strong and sweet within her. She found her ideal hero, Adam Bede, in her recollections of her father, so clean and strong and honest—a plain man with a great nature. And she found her heroine, Maggie Tulliver, in the recollections of her own quaint self (looking back on herself in that detached and impersonal

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way in which artists so often see themselves, as something quite disassociated, something as objective as all the other people are),—the strange, wayward little girl, growing up in illiterate surroundings, and making companions of the strangest fancies and reading the strangest books for little girls, like Defoe's "History of the Devil" and Goldsmith's "Animated Nature," and feeling very lonely, and not understanding why, and finding "the need of being loved the strongest need in her nature"—just like George Eliot herself, who simply had to be loved.

In returning to these early scenes for her material, George Eliot showed more discrimination than we realize unless we understand her position in the great world and the experiences through which she had passed when she first "commenced author." There had been two events in her later life which might well have overshadowed and rendered relatively unimportant the small things that belonged to her obscure childhood. The first of these events, if so it may be called, was her abandonment of Christianity as a definite faith founded on divine authority. Religious to the depths of her soul and in all her processes of thought, she had been from childhood and continued to the end of her life. In comparison with such novels as "Romola" and "Adam Bede," the novels of Dickens and Thackeray seem almost pagan, so lightly do they touch spiritual things. Yet Dickens and Thackeray were fundamentally Christian, with a broad though not very intense faith, and George Eliot was certainly not Christian in any sense that has any definite meaning. When she and her father moved to Coventry, she being then twenty-one years of age, she came much into the society of two families, the Brays and Hennells, people of advanced religious views. Hennell wrote a book on the origin of Christianity which no less a person than David

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Friedrich Strauss regarded as so important that he arranged to have it translated into German. Three years previously Strauss had published his "Das Leben Jesu," which had such important effects upon subsequent higher criticism, a book wherein the historical Jesus was explained away on the theory of the mythus. The translation of this famous book into English was George Eliot's first literary work. She gave two laborious years to it, and when it was published she was twenty-seven years old. She had become a skeptic, and felt that it was inconsistent for her to attend church.

This cessation from church-going made a breach between her father and herself. Robert Evans, the carpenter, was an intelligent, hard-working British artisan, upright, conservative, a sound adherent of the Established Church and the British Constitution. His idealized portrait is Adam Bede, and yet not idealized out of recognition; for when the book appeared an old neighbor exclaimed, "That's Robert; that's Robert to the life!" How noble he must have been to be thus recognized in the devoted daughter's portrait of him is understood by those who have read the book. How painful must have been a breach between them is easily imagined. After a time the daughter's love for her father overruled her scruples. She resumed church-going, and the father seems to have refrained throughout the remainder of his life from inquiring into her views. But though there could not be complete intellectual sympathy between the two, their mutual love was undiminished. She nursed her father through his last prolonged illness, and when he died she was all but prostrated.

. After his death she went to London as assistant editor of the "Westminster Review" and formed a circle of acquaintances among the radical scientific and philosophical

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men and women of the city. She came to know intimately the younger men of science. It is amusing now to read in her letters of her first meetings with some of these men who were destined to be so famous. Thus she writes that she has just met "a Mr. Herbert Spencer," and, in another letter, "we had an agreeable evening Wednesday—a Mr. Huxley being the centre of interest." Under the influence of such men she acquired a profound interest in natural science and the new theory of evolution, which then seemed so incompatible with revealed religion.

She and Tennyson and Browning are, perhaps, the chief nineteenth-century makers of English literature who felt most keenly the conflict of science and religion. Tennyson and Browning weathered the storm, Tennyson holding to faith in spite of evolution, Browning finding in evolution one of his most potent arguments for dynamic Christianity. But George Eliot's faith in Christianity was gone not to return, though she revered Jesus as a teacher of the highest morality and spirituality.

When the positivist philosophy of Auguste Comte began to make an impression on radical Englishmen, George Eliot accepted it, for it seemed to answer some of her difficulties. She could not believe in individual immortality, but the immortality of the race and of the individual's influence on the race she did believe in with all her mind, and perhaps the chief purpose of her novels was to emphasize the enormous responsibility which each individual has to mankind, and the absolute indestructibility of deeds. She could not believe in a personal God, but she did believe intensely in the organic growth of civilization according to regular laws. Positivism told her that the Great Being is Mankind, and with Positivism she cast in her lot. But she sweetened the somewhat barren creed with all a woman's tenderness, with all the

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yearning of a true lover of humanity, and with all the tolerance of one of the broadest natures of which we have a record.

Among her radical philosophical friends in London was George Henry Lewes, a brilliant man who was doing much to make the higher German speculations known in England. George Eliot's union with this man was the second great event of her life. Lewes's wife was living but had twice deserted him. Twice had he taken her back and forgiven her. He was living with her when he met George Eliot. I am not going into the details of this famous case. I have neither time nor inclination. The data for a judgment are these: The general divorce law had not been passed in England—was not passed until it was too late to serve the needs of George Eliot and Lewes. Under any conditions divorce could be had only by special act of Parliament, at great expense, and Lewes was poor. But even if he could have afforded expensive legislation, divorce would have been impossible in his case, for under the law he had forfeited his right to legal separation when he took his wife back and renewed his marital relationship with her. George Eliot believed in marriage as one of the most beautiful of human institutions, but she did not believe in it as a right of the state's to enforce. She believed that under the circumstances she had a moral right to take Lewes for her husband, though the union could get no sanction from the state. It was on her part a deep spirit-love of a deeply spiritual woman; on his part, devotion to a woman who embodied for him the best of womanhood. They followed no whim of passion, and violated no principle of conscience. Though many of their friends had been disaffected by this union, they came in time to modify their adverse views, to recognize that, though these things are dangerous to society, these

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two were exceptionally high-minded people in exceptional circumstances. Those are the facts. I shall certainly not attempt to pronounce judgment. Any reader can judge for himself, if he feels it necessary to judge. There are some things in the world which seem to call chiefly for silence.

Without the union we should probably never have had George Eliot the novelist, for, as was said at the outset, it was Lewes who fairly forced her to become a novelist. He was her chief counselor and critic, and shielded her from the annoyances which attend authorship, being especially careful to keep from her the adverse reviews of her books. According to one explanation of her pseudonym, she took the name "George" because it was his name, and took the name "Eliot" because it was "a good mouth-filling, easily pronounced word." And she took for the scenes of her first novels the old home memories.

Thus I return to my point that she showed discrimination in the choice of her scenes. She had accumulated so much other material which she might have used: the material of a wide experience of people and affairs; of a deep experience of life in her own career; even of a sensational experience. Radical indeed were some of her ideas, and daring was her conduct under the influence of these ideas. But none of this radicalism gets into her novels. There is no attack on marriage there. She still believed in marriage as one of the most beautiful of human institutions, though her own marriage was without the sanction of church or state. For some reason, perhaps a reluctance to shake the religious and social faith of others, perhaps sheer affection for the old simple things of her early days, she turned away from all this radicalism to the old memories. She had known great people, for among her friends were not only men of science and the philosophers, but also the greater literary men, Carlyle,

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Tennyson, and Dickens. If a novelist has mingled with the great world it is a temptation to put that world into books—a temptation seldom resisted. A clever woman likes to display her own cleverness by analyzing the clever people she knows. But George Eliot was not clever; she was only great. And so she instinctively followed her heart back to the old home with its humors and its tragedies. She saw how comical were these rural types, but she loved them with all her extravagant power of loving, and she believed in them; she even believed in their religion for them. Intellectually she could not agree with them, but says she herself, "We turn to the *truth of feeling* as the one universal bond of brotherhood."

And so this heretic drew sympathetic pictures, one after another, of simple preachers and "exhorters," some belonging to the Established Church, some to the dissenters, the most conspicuous, of course, being Dinah Morris. She did not believe what these people believed in their terms, but she had the utmost sympathy with their spiritual aspirations and their spiritual sorrows. Dickens loudly summoned aid for those unjustly oppressed whom government can assist; George Eliot pleaded for sympathy for that which no law can remedy, the saddened soul. "Depend upon it," she wrote in "The Rev. Amos Barton," "you would gain unspeakably if you would learn with me to see some of the poetry and the pathos, the tragedy and the comedy, lying in the experience of a human soul that looks out through dull grey eyes and speaks in a voice of quite ordinary tones."

Every one must have thought of this dualism, the outward man and his inner life. You go into an office to transact a piece of business. The man talks to you in the crisp phrases of business, or the easy inutilities of social small talk, but at that very moment there may be in his soul all the

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elements of the tragedies that the poets have tried to express. What do you know of this man's inner life, its anguish and its transports? He veils them in conventional speech. What does he know of your inner life? You also play the game. On life's stream play many lights and pleasant ripples and dimpling counter-currents and sparkling sprays and frothy spume flakes, but under these surface shows of things is the steady current making irresistibly for that ocean which is Destiny. To mark the course of those silent undercurrents was part of George Eliot's purpose. So she injected her deep religious experience into her memories of the simple folk who dwelt about Griff and Nuneaton, and created a wider sympathy for those who lead obscure lives.

I must confess that in my opinion her best work is in these earlier biographical books. But this is merely *obiter dicta*, not intended to influence the opinion of anybody who happens to think otherwise. There are those who prefer "Middlemarch," and those who prefer "Daniel Deronda," and even some who prefer "Romola" to the earlier books which are my preference—"The Mill on the Floss," "Adam Bede," "Silas Marner." Where there are so many claimants, evidently there is much excellence. Unlike Scott and Dickens, George Eliot did not write a vast number of novels, and, also unlike them, she wrote none distinctly beneath her genius. But the habit of analysis increases in the later books, the story is overweighted with philosophy, and the "novel of purpose," with so many melancholy sequels, becomes apparent in "Daniel Deronda."

One character prevails in these books, the girl with a soul cramped by narrow or untoward conditions, striving for liberty and light, for breathing-space and an opportunity to express herself as a free individual. She appears as Maggie Tulliver, Dorothea Brooke, Romola, Gwendolen Harleth.

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Of course she is George Eliot herself, with modifications, but she is also the woman who has been evolved by changing conditions in the social, educational, and economic world. She belongs to the new era of woman's participation in the intellectual life of the world. She is in the American college, the Parisian studio, the musical conservatory, the social settlement, the battle for political freedom, the struggle for economic independence. Hers is the tragedy of all transitions, the readjustment of what is fundamentally natural to what is unconventional and new. Hers is the tragedy of experiment, far sharper than with men, for whom so much is predetermined by age-long usage. She has a sensibility such as few men have, and suffers as few men can suffer. For these noble unhappy ones George Eliot has spoken; she has created them as surely no one else ever has.

George Eliot's favorite masculine character was of the type of Adam Bede. His calm, plain, honest, clear outlook on life, his power to stand firm against all the winds of fate and passion, his complete reliability, made this type her favorite. Less thoughtful women than George Eliot may admire a man because he is clever; George Eliot had known many clever men, had "married" one, but when she came to depict her ideal hero she chose one not clever but strong. Social position and education were of no more consequence than cleverness. Let him be a man with all the simple virtues which the brave old name of "man" implies—courage, constancy, power to dare and to do. And so her memory yearned back to her own father, honest, plain Robert Evans, and from that memory she idealized her own most honored hero.

Every reader, man or woman, must admire him; but, after all, he is created rather as a woman would look upon a strong man than as a man would see him; that is to say, a

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woman would see him stronger, more nearly perfect than he really is. A hero in a woman's eyes is more heroic than in a man's. Mr. Dooley—Mr. Martin Dooley—once turned literary critic, in order to remark on this. He notes the circumstance that the heroes of women novelists are so much more heroic than those that men manufacture. He says in effect that when a hero knocks down six ruffians with his right hand without removing his left from the heroine's waist, we may be sure the author of the book was a woman. A man novelist cannot help wondering what the other fellow would be doing all the while. Mr. Dooley finds the explanation in the fact that every man's hero is himself, and therefore a man has some broad conceptions about the limitations of a hero. But Mr. Dooley declares that every woman's hero is some popular "romantic" actor.

You remember Dobbin in "Vanity Fair." His traits of character are much the same as those which George Eliot had in mind, but you will observe that, with all his nobility, Dobbin is a bit of a fool. Thackeray loved him, and we love him; but it is of "poor Dobbin" that Thackeray writes, and we generally think of him as "poor Dobbin." It is rather an interesting contrast, that of Dobbin *versus* Adam Bede, Thackeray *versus* George Eliot, a man's way of depicting an almost faultless fellow and a woman's way. It is not necessarily cynicism; Thackeray is not making the deduction that all good men are just a little foolish,—not at all. He is rather saying, by implication, that no man is perfect; each has some defect; on the fairest flesh nature will leave some blemish. Dobbin just happens to be rather a fool; if he were not that, he would be something else undesirable. Had Thackeray been creating Adam Bede, he would not have hinted that Adam was a fool, for assuredly Adam is no fool; but I think I know exactly what Thackeray

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would have done: in that confidential, personal way of his, he would have leaned out from the pages and whispered in our ear, just for us and nobody else to hear, that Adam's conversation is just a little dull. And so it is. But George Eliot did not know it,—she so believed in her hero.

But she has her revenge. She shows what a fool a man is to be captivated by a pretty head with nothing in it. The view which Mrs. Poyser takes of Hetty (a "strutting little peacock") is probably just the view which George Eliot took of her until a great tragedy had made Hetty impressive. Suppose George Eliot had created Amelia Sedley,—the Amelia whom Thackeray loved,—her keen sense of humor would pretty certainly have played about poor little helpless ineffectual Amelia, and she would have shown what a veritable goose the child really is. Lucy Ashton, Dora Copperfield, Amelia Sedley,—there are three famous heroines! Scott and Thackeray created theirs for the world to admire, Dickens created his for the world to pity. It would have added to the gaiety of nations if George Eliot, who has commented upon such women in general, had expressed her frank opinion of these three heroines. It would have increased the world's store of humorous literature. If a man finds a woman's hero a little uninteresting, a woman sees right through a man's heroine.

If George Eliot's ideal hero is a little wooden, she has created one masculine type which is terribly true. This is the man who goes bad because he tries to justify his own motives to himself, the man who goes to the dogs by a process of self-sophistication. Here appears several times, is most clearly seen as Captain Arthur Donnithorne and Tito Melema. When young Captain Arthur Donnithorne, in "Adam Bede," starts on that ill-omened fishing-trip, he is, in his own opinion, as honest and clean a fellow as you would find

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in England. When he meets Hetty in the woods he suddenly realizes that he is captivated by her fresh young beauty. Panic fear of dishonor seizes him, and he leaves her abruptly. The man is safe, and the girl is safe. The brief battle is over, the victory won. There is nothing to do now but take up life bravely and live it gladly. But he is not content; he reviews the episode, recalls his abrupt departure and her startled look. He must go back and explain that he did not mean to hurt her feelings. He is a man of tender sympathies. He must remove the impression that he meant to be cruel. It is right to go back. In his heart of hearts he knows that his wish to see her is mingled with the honest motive to relieve her mind, but he reasons with himself until he is convinced that it is right to see her again, that not to see her would be wrong.

And so he goes back and is more deeply enmeshed, and yet there is time for safety, only it must come from without now. He will call on his old friend Mr. Irwine, tell him all, get support for his good resolution. But he gives the old man a hypothetical case instead of a frank confession, even falls to arguing that some men are more intricately bound up in "circumstances" than other men. With his hands on the horns of the altar of safety, he again grows sophistical, and tries to plead with his conscience that the worse is the better part. When at length the old clergyman asks him directly if it is of himself he is speaking, he denies it, says it is only a hypothetical case, and allows the old man to shift the conversation to impersonal and trivial things. Even as he does so, Arthur knows that he is lost. As George Eliot puts it, "the opportunity was gone. While Arthur was hesitating the rope to which he might have clung had drifted away—he must trust now to his own swimming." And I may add, he can't swim. Those who know the book know the sequel,

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and those who do not know the book, will have little trouble in guessing it. The man sophisticated himself and another away from salvation.

The case of Tito Melema is classic. Fascinating to men and women alike, almost childlike in his purity, he slips his moorings, and we follow his soul to the Gehenna which he deliberately prepares for himself by arguing with himself that every wrong he is about to commit is, under the circumstances, right. His plain duty is to go in search of his father, but his pleasure lies in Florence. He raises in his mind one argument after another to satisfy his conscience that his search would be a fool's errand, that his father is in all probability dead, and that he owes it to himself to remain in Florence. As is characteristic of such natures, he does not finally abandon all idea of the search until he has said to himself the actual words, "I believe he is dead." So he meets every duty with sophistry, justifying himself to himself, until he loses the love of his wife, the respect of his friends, and we see him, in the end, a drenched corpse on the banks of the Arno, with the fingers of his wronged father twisted in his throat.

In after years Romola reads his epitaph to the child Lilo, summing up his character and career in these awful words—all the more awful because of the simple vocabulary adapted to a child's understanding: "There was a man to whom I was very near, so that I could see a great deal of his life, who made almost every one fond of him, for he was young and clever and beautiful, and his manners to all were gentle and kind. I believe when I first knew him he never thought of anything cruel or base. But because he tried to slip away from everything that was unpleasant, and cared for nothing else so much as his own safety, he came at last to commit some of the basest deeds—such as make men infamous. He

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denied his father, and left him to misery; he betrayed every trust that was reposed in him, that he might keep himself safe and get rich and prosperous. Yet calamity overtook him."

The careers of such men were in George Eliot's eyes among the worst of earth's blasphemies, for they violated the fundamental tenets of her moral philosophy—our responsibility to ourselves and others for what we do, and the absolute indestructibility of our deeds. "Our deeds are like children that are born to us, they have an indestructible life apart from us. Nay, children may be strangled, but deeds never"—so she writes in "The Mill on the Floss." Remorse and its better-begotten son Repentance, George Eliot recognized, but she held that all the penitence in the world cannot alter the condition wrought by men's deeds on earth. In heaven we may escape the consequences of our deeds, but never on earth. Or, as another has said:

"It is a good and soothfast saw,
Half roasted never will be raw,
No flour is changèd back to meal,
No crock reshaped on the wheel,
No curds changed back to milk again,
Nor 'Now,' by wishing, back to 'Then';
When once you 've tasted stolen honey,
You can't buy innocence for money."

Or, as Omar Khayyám puts it:

"The moving finger writes, and having writ,
Moves on; nor all your piety nor wit
Shall lure it back to cancel half a line,
Nor all your tears wash out a word of it."

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And this simple moral is the chief message of George Eliot's books. Much might be said, much has been said, about her philosophy. But the practical lesson she came to deliver in many forms and characters is this: that what we do, either of good or ill, either in a small way or a great way, lives on in the affairs of men; it is transmuted through the generations, and it works through generation after generation, forever and forever. This is the conservation of moral energy; this is the correlation of moral forces; this is the immortality in which she believed.

All philosophy is an expression of half truths, or part truths, for the philosopher is mortal, and by reason of his mortality can see truth only in part. George Eliot has seen and expressed a part of the truth, an important part, that people must pay the price of the things they do. There is no escape. The act has its determining influence upon our lives; nothing can ever be as if it had never been; what we do, that we are; we make our own destinies by our acts. All that is absolutely true, and all that is, by implication, in the philosophy of George Eliot. But philosophy ought not to stop there, and unfortunately George Eliot does practically stop there, and that is the reason why the sum total of the impression she makes is saddening.

What George Eliot neglected to point out is that to which the William Blakes, the Nietzsches, even the Bernard Shaws, have summoned our attention, namely, that the power of the will and the recuperative power of Nature are greater than evil, that evil need not be a finality unless we choose to make it so, that after the thing is done and destiny set in motion the case is still not hopeless, that nothing is ever hopeless for people who will rely on the valor of the good will and the readiness of Nature to heal wounds and remove everything but the scar,—the scar is never removed,—that

even through evil people may pass to good if they have the will and the courage and the perseverance. It is a bitter process, and he who would choose it for the experience of it is a fool; but, once in, it is better to fight the way out than to continue forever in the paralyzing grip of the thought of the deterministic quality of evil.

Physicians warn people against those nerve strains which undermine and wear out the human system; they plead with their patients to shun those perils, as preachers plead with sinners to forsake their sins. But when, in spite of all the warning, the man has broken down, the wise physician does not stand at the bedside wagging a solemn head, saying, "I told you so," prating of the finality of evil, and quoting George Eliot and Omar Khayyám. The wise physician tries to show the way back, to show how great Nature is waiting to work a cure, to show the man the power that is latent in his own will, the power to begin all over again, to be well.

It is far, far better never to violate Nature's sanctities. It is far, far better not to err, not to be stupid and a fool. But when the mischief has been done, it is far better to re-summon the spiritual energy than to sit down in dejection and spend the remainder of life lamenting folly. Remorse is one of the most weakening of the passions, repentance is a tonic; remorse is the mood of despair, repentance the mood of hope. And unless we hope we perish. The world belongs to the valiant, not to the skulkers.

George Eliot did not counsel skulking, but the implication of her novels is that evil is a finality. Evil is not a finality. Evil is tragic, loathsome, strong. But there are stronger things in the universe than evil. A valiant will is stronger, Nature is stronger, God is stronger. And in brave reliance on these efficiencies, the Will and Nature and God, the heroes of mankind have fought their way to glory.

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Even evil itself may be turned into an indirect means of salvation by those who will. Some men have first understood the greatness of their opportunity by first understanding the hideous quality of evil. Not until evil gripped them did they really fight. And except we fight we die. The very ability to carry on the fight necessitates a faith that in some way evil can be turned to good.

That is the other half of the view, the half which George Eliot almost neglected, the half which, had she regarded it, would have illuminated her novels with the beauty of hope. There are in her novels instances—Godfrey Cass for example—which suggest the recuperative idea, but her work, taken as a whole, lays the emphasis on the inevitability of the dire result. Her novels, which are now sternly sad, would have been sternly joyous had she, without mitigating the solemnity of responsibility and the far-reaching influence of deeds, shown that other side, the fresh start and the fighting chance.

HAWTHORNE THE PURITAN ARTIST

HAWTHORNE was a Puritan by temperament and descent from a long line of Puritan ancestors. But he was an artist also by temperament, and under the stimulation of the newly awakened feeling for literary art in New England in the early years of the nineteenth century. Thus he stood at the juncture of the Past and the Present and in full sympathetic understanding of both. He had the strong feeling for the past which belongs to all romantic natures, and he had the feeling for artistic expression which came to New England, after a long suppression of the art instinct, when its intellectual horizon was widened by contact with the modern world of thought.

The most significant fact in the literary history of New England is the supersedence of Puritanism by Transcendentalism among the more highly educated classes. This brought nothing less than an intellectual and artistic Renaissance to New England. But Transcendentalism was not a mere reaction; it was in part an outgrowth of Puritanism, an extension of the idealistic element in Puritanism, a new and broader manifestation of the old Puritan tendency to magnify Soul above everything else. One might say, if epigram were not dangerous, that the Puritan's thought was fixed entirely on man's soul and an angry God, and that the Transcendentalist's thought was fixed on man's soul and an infinitely mysterious universe.

Moreover, the morality of Transcendentalism in New England was precisely the old morality of Puritanism. Men's thoughts on religion had widened and grown somewhat vague, but men's thoughts on morality had not widened at all and were not in the least vague. The morality of

Transcendental Brook Farm was exactly the morality of Puritan Old South Church. Men held somewhat different ideas than their grandfathers about the way the ten commandments were delivered from Sinai, but they held exactly the same ideas about the binding quality of the commandments. Puritanism sank too deep into the New England character to be expunged in a generation by any new mode of thought.

And it had sunk too deep into the character of Nathaniel Hawthorne to be eliminated by the new influence of thought and art in the New England of his day. The first Hawthorne (or "Hathorne," as the name was originally spelled) in America came over with John Winthrop in 1630, and had his part in making the new country for conscience' sake. His son John was one of the judges in Salem who sent the witches to the gallows, and it was out of the tradition of a curse pronounced on the judge by one of the condemned witches that Nathaniel got a suggestion for "The House of the Seven Gables." They were Puritans of the Puritans, these Hawthornes, and defenders of the faith. Their distinguished descendant, the novelist, shuddered at the memory of their harsh deeds, but he also understood them. His typical attitude toward the old Puritans was a thorough understanding of their mental processes combined with horror at the results of those mental processes. He had much of their brooding nature; he was born in Salem, lived for a while in Raymond on Lake Sebago in Maine, went to Bowdoin College, lived for years after in seclusion at Salem, and all the while, singularly alone, he was brooding on the mysteries and dark implications of life.

But with all this he was also an artist, the most consummate literary artist of American letters thus far. He was a romantic artist, drawing most of his material from the Past,

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legendary, symbolical, mystic, fanciful. But all the wonder and the mystery in his stories is shot through with verisimilitude. Leslie Stephen has said, "No modern writer has the same skill in so using the marvellous as to interest without exciting our incredulity"; and Hawthorne himself said that he strove to "mingle the Marvellous rather as a slight, delicate, and evanescent flavor than any portion of the actual substance."

He wins this delicate, evanescent effect, "between the Real and Fantastic,"—and it is perhaps his chief quality as an artist,—by various methods: by disavowing responsibility for the legend he is reporting, for it is his habit to detach himself from the legend by some such phrase as "tradition says" thus and so; by mingling with the old weird legend some modern scientific explanation,—as for instance, a hint of apoplexy in a mysterious death to which tradition had assigned a supernatural cause; and by using the modern idea of mesmerism to explain phenomena which were ascribed to demoniacal possession in the old Puritan days in New England. Maule's Well in "The House of the Seven Gables" was cursed by its former owner, and, curiously enough, its water did begin to produce illness in those who drank of it; Hawthorne hints that the depth of a cellar which had been dug for the new house may have disturbed the sources of the well and let in salt water, but dexterously leaves with the reader a lingering idea that possibly a "subtler cause"—the curse on it—may, after all, have changed its character.

Above all, he secures his effect by the somber, misty gray atmosphere in which nearly all his stories, whether full-length novels or short tales, are wrapped, and this atmosphere is appropriate to the purposes of the artist of Puritanism. I write these words on a gray day at a window overlooking Lake Michigan; water, sky, and landscape are

all in one tone; the smoke from the steamers, locomotives, and foundry stacks are merely lines of deeper gray in a world that is all gray,—a world in monotone. Some people would call this a forbidding landscape; they want the sunshine of Corot, the brilliancy of Turner, the mellow glow of Inness, but Whistler would see in this very monotone the artist's opportunity. So Hawthorne saw the artist's opportunity in that gray pall which the New England conscience stretched over two centuries of New England history.

New England appealed to him as a Puritan, but it also appealed to him as an artist. He shuddered at the spectacle of sin and the inexorable New England conscience in a death grapple, but he also saw that right here was the opportunity for all the romance one could desire. Only a man of his delicate spiritual discernment could have discovered and expressed it. Walter Scott would not have found it there; he needed the noise and color that go with chivalry. But, on the other hand, Hawthorne would probably have been stunned into silence by an old country with a brilliant feudal history like Great Britain's. He was essentially a reflective-imaginative writer, brooding over a few suggestions until they yielded up to him their utmost possibilities of romance. His imagination would have been confused by a wealth of material. He got much out of the little, out of New England.

He has as truly expressed Puritan New England as Henry Fielding truly expressed beef-eating, ale-drinking, eighteenth-century England. The most robust of the British novelists have worked on big and crowded canvases; Fielding and Dickens introduced into a single novel a great many characters of diverse traits and strongly marked eccentricities; their genius had scope and huge vitality. But the genius of Hawthorne was intense rather than broad;

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into one of his novels he put only a few characters,—about five in “The Marble Faun,” not more than six in “The House of the Seven Gables,” practically only three in “The Scarlet Letter.” The range is narrow, but the vein is deep; into these few characters Hawthorne probes until the utmost secrets of their inmost lives have been revealed; and the episodes are as few as the characters, but also as deeply significant. His is the art of concentration; what he loses of the wide sweep of Fielding and Dickens, he compensates for by depth below depth of character, of personality, of spiritual and psychic experience. All this peculiarly fitted him to be the artist of a people with whom the inner life was the supreme thing, the only thing of real importance.

Puritanism in New England developed the conscience into a singularly delicate instrument of slow torture. Conscience is the special New England faculty, its development the New England *métier*. As Renaissance Italy developed a sense of art so sure and penetrating that it has been called “clairvoyant,” so Puritan New England developed a special quality of conscience. And the effect of it has never departed. To this day the New Englanders have never liberated the conscience. Unitarianism, Transcendentalism, Agnosticism, Spiritualism, Buddhism, and all the other “isms” known to modern thought, have in turn swept New England, but the New England conscience has remained intact, like the storm-swept, rock-bound, unyielding New England coast.

Mr. W. D. Howells has perceived this and given it clear expression in many of his novels, with their New England women who have been emancipated from so much, but never from the sway of conscience. Mr. Howells has done nothing shrewder or cleverer than this reiterated portrait of the over-conscienced woman. She is a residuum of Puritanism,

without her grandmother's defined convictions, but with all of her grandmother's resourcefulness in unhappiness. She finds the opportunity in all manner of moral mores and social scruples to make herself wretched for conscience' sake, and to make everybody else wretched for her own sake, not from ill-nature, but through an inbred distrust of the ability of Providence to conduct the universe without her fidgety interference. In short, she suffers from enlargement of the conscience, is sure she must be doing wrong if her mind is at peace, is happy only when she is miserable, and thoroughly miserable when she is happy.

Not in its humors but in its solemnities, Hawthorne has depicted conscience excited by sin. Sin was the supreme fact of the world to the Puritan, and so it was to Hawthorne, the Puritan artist. "Sin" is an old-fashioned word; nowadays we substitute some softer, vaguer word, "evil" or "error"; but to the theologians of New England the thing was *sin*—a transgression of the law of God. It would be a long catalogue if I should name all the short stories which have sin and conscience for their theme: "The Minister's Black Veil," "The Wedding Knell," "Rappacini's Daughter," "Dr. Heidegger's Experiment," "Roger Malvin's Burial," and many more of the "Twice Told Tales," and "Mosses from an Old Manse," are in this somber category. And in each of the three great novels there is a perfectly defined sin with its variety of retribution: in "The Scarlet Letter" the sin is adultery; in "The Marble Faun" it is murder; and in "The House of the Seven Gables" it is tyrannous injustice arising from cupidity. In all three the retribution is complete.

Hawthorne's theme is sin, not in the flush of its commitment, but in the slow cumulative results of the punishment. In "The Scarlet Letter" and "The House of the Seven Gables"

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the sin has been committed before the story proper opens, and in "The Marble Faun" the actual committal of the sin occupies only a few lines of indirect statement, and is itself the result of another and darker sin which had been committed before the story opens. The moment the thing is done the consequences begin, and it is on these consequences that Hawthorne concentrates all his attention and all his genius. The deliberate and unsensational quality of his style is admirably suited to reveal the inexorable, cancerous, fatal growth of the consequences. The wickedest ingenuity of man has never invented a torture to equal the slow torture of conscience, and Hawthorne, whose power lies in depicting states of mind rather than action, is a complete master in portraying this torture, as in Dimmesdale and Hester in "The Scarlet Letter," as in Miriam and Donatello in "The Marble Faun." Hawthorne is a romanticist, not a realist, but he is a romanticist with all the power of psychic analysis which is supposed to be the realist's peculiar possession. He depicts romantic wonder with the power of Walter Scott, realistic remorse with the power of George Eliot, psychic horror with the power of Edgar Allan Poe, and all with a delicate, evanescent quality of suggestion which is his own.

Like all great moralists, he perceives that the consequences of sin are not confined to the committers of it. That is one of the baffling mysteries of the world, that the innocent, sometimes the innocent yet unborn, must suffer for the guilty; or, as he himself puts it in his solemn epigrammatic way, "Every crime destroys more Edens than our own." The main theme of "The House of the Seven Gables" is the cumulative effect, through generations, on the Pyncheon family of Colonel Pyncheon's sin of injustice to Matthew Maule. Poor Hilda in "The Marble Faun" (and Haw-

thorne's skill in depicting almost divine purity of maidenhood is as excellent as his power of depicting sin)—poor Hilda, through not the slightest fault of her own, is involved in the coil of sin wound up by the murder which Miriam and Donatello commit, and this is shown with a subtlety possible only to the very greatest literary artists.

Twice Hawthorne has drawn radiant maidenly purity with something like terror of its awful loveliness—in Phœbe of "The House of the Seven Gables" and in Hilda of "The Marble Faun"; and then he conceives that such purity as this may be withered and blasted by the mere knowledge of evil, without the slightest participation in the evil, like a tender flower shriveled in a hot wind. It was this conception that Coleridge had in mind when he wrote "Christabel." It required great genius to reveal the slow stages of soul-sickness that come to Hilda from her mere knowledge of the murder done by Miriam and Donatello. Says Hilda: "I see how it is, Miriam. I must keep your secret and die of it. . . . Ah, now I understand how the sins of generations past have created an atmosphere of sin for those that follow. While there is a single guilty person in the universe, each innocent one must feel his innocence tortured by guilt. Your deed, Miriam, has darkened the whole sky!" And then Hawthorne himself adds those pregnant words, "Every crime destroys more Edens than our own."

This is delicate insight into the nature and consequences of sin, but it is not the subtlest that Hawthorne reveals. He has shown that there is in sin itself, and in its consequences, a transforming power and a developmental power. To do this and, at the same time, keep perfect faith with the Puritan conception of "the exceeding sinfulness of sin," required something more than genius, it required a spiritual discernment akin to the prophetic. It is Kenyon, in "The Marble

Faun," who sees that Donatello is undergoing a transformation, that a soul is awakening in him as the result of his sin and the anguish that followed. The book was published in England under the title of "Transformation," and this is the significance of it: Donatello, a glad, careless, innocent animal, commits a murder, and by dumb agonies grows into a grave, earnest, spiritual man. It is Hilda, however, the perfect Puritan maiden, who declines to recognize this transforming power of sin. And one fancies that unconsciously Hawthorne represented in these two—Kenyon and Hilda—a struggle that went on in his own mind, between the rigid Puritan view of sin and this wider view of the power of sin itself to produce a spiritual quality. In "The Scarlet Letter" the sin which demoralized and practically crazed Arthur Dimmesdale, produced in Hester a slow and agonized development into noble womanhood.

In neither case is there any palliation of sin; in both cases—that is to say, in both "The Marble Faun" and "The Scarlet Letter"—Hawthorne declines to allow happiness. It was a true perception which forbade him to permit Dimmesdale and Hester to go away together. Regarded rationally and realistically, it seems no such huge addition to the sin already committed, a sin which has already marked these two for disgrace and Dimmesdale for slow death, that they should go into exile together. They have nothing more to lose, and Hester may save the man's life by nursing him; but the solemn idea of retribution forbids this; this carved, poised, statuesque story, not of passion but of passion's fatal result, must not be permitted to deteriorate into a mere story of an elopement. And so in "The Marble Faun" Miriam and Donatello, bound to each other in the bond of murder, are not permitted to be bound in the bond of happiness. Very solemnly Kenyon adjures

them to work out their souls' salvation, as they may, by mutual helpfulness in dual penance, but not to seek that happiness in love, which belongs to the innocent.

There is no slackening of Hawthorne's firm grasp on the true nature of sin, and there are no palliations, and yet he shows that there is this transforming and developmental power in sin, for that also is a fact of sin. Henry James has said that "Hawthorne always knew what he was about." Henry James was talking about Hawthorne's art, but it is equally true of Hawthorne in the ethical world. There also Hawthorne knew what he was about. Hawthorne knew the facts of life too well not to see that men and women sometimes pass through the fierce fires of sin and remorse and come out purified. No sane person would choose the process of development through which Donatello and Hester Prynne passed, for it is as bitter and terrible as damnation itself. It would be easier to die or to go mad, and if one were choosing, he should choose death or madness. But the facts of life remain, and Hawthorne saw them,—sin does sometimes transform and sometimes develops.

Hawthorne sees one more thing about sin,—that sometimes even out of sin there comes the flower of life and purity. The child Pearl is the fruit of the sin committed by Dimmesdale and Hester Prynne. It is written that the sins of the fathers are visited upon the children, and one purpose of "The House of the Seven Gables" is to show how far-reaching and enduring is that law. Shall not the child Pearl, then, be punished for the sins of her parents? Instead, she flits through the story—"The Scarlet Letter"—like a beam of light, and grows up into pure and perfect womanhood. Her parents have expiated their sin in their own lives and souls. Day by day, hour by hour, and breath by breath, they have "paid in full." At the end of the book Hester sums

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it up in one cry, a bit of simple realism uncommon with Hawthorne, but in this instance realism was as sufficient as classic art to express the magnitude of the thought; so Hester says to Dimmesdale: "Surely, surely, we have ransomed one another with all this woe!" And perhaps they have ransomed Pearl, and there is nothing left for her to pay; out of the dunghill of passion has sprung this fair child-flower, out of the lion's rotting carcass this honey-sweet, out of sin and death this immortal life. Sin is very strong, but God is stronger than sin. Sin as well as righteousness has its spiritual laws, and Hawthorne understands them all.

It is by his penetration into the utmost secrets of sin, by his firm, delicate handling of all its phases, that Hawthorne contrives to leave in the mind of his reader no such sense of despair as follows the perusal of the books of the realists, even one so greatly pure as George Eliot. With the subtlety of his perception, strengthening rather than weakening the sense of sin's terrible and inexorable law's, he yet contrives to show that sin, though a dreadful fact, is a fact of a world which God has not deserted. The impression he leaves is solemn and solemnizing, but not despairful.

In expounding this solemn theme Hawthorne employs a style which is surely the purest that has yet been achieved in America. It is a style so different from that of the current novel and magazine story that the first impression it makes on a reader accustomed only to more modern methods is probably that of formalism. The careful student of Hawthorne will observe that nearly all of his books open a little stiffly. Gradually the author warms up to his work and transmutes formality into sublimity.

This is noticeable in all of his full-length novels, but especially in "The Marble Faun." It was the last of his great novels, and the only one with the scene laid out of New

England. It is set in Italy, though two of the most important characters, Hilda and Kenyon, are New Englanders. The foreign scene, the somewhat extraneous description of Rome (Hawthorne apparently could not escape a sense of duty to make his novel a sort of sublimated guide-book for less fortunate New Englanders who had not had his privilege of travel), and perhaps the effect of advancing years, make his novel more than usually labored in its first part. It is not until Chapter XIX, the chapter following the brief account of the murder, that he rises to his full power, but then the effect is nothing short of sublime.

Donatello, a non-moral, not immoral, faun-like creature, who is in love with Miriam, a vivid girl with mingled Italian, Jewish, and English blood, has thrust over a cliff to his death a man who had a mysterious power over Miriam and was blighting her life. Donatello thought that he saw in Miriam's eyes a permission to commit the act, and Miriam, knowing that the wish was in her heart that she might be finally rid of her persecutor, fears that Donatello may have read in her eyes an unconscious assent to the dreadful act. So these two are suddenly bound together by crime. There sweeps over Miriam an exalted sense of freedom, of power, combined with a consciousness that she is no longer dreadfully alone in the world, but is forever knit up with this beautiful young murderer; and in a mental intoxication she feels that she has suddenly been inducted into a new fraternity, and is the sworn and trusted sister of all murderers, high and low, from those who assassinated Julius Cæsar (they are passing through Pompey's forum) to baby stranglers,—for, says Hawthorne, "guilt has its moments of rapture, too"; and over all there is a sense of doom that can never be escaped, a coil twined about these two that will slowly annihilate them. As they pass Hilda's window they

see her standing in an attitude of prayer. The image of this pure girl breaks in on the wild confusion of guilt, and overwrought passions, and the dark night, with startling effect, like Macduff's arrival at Macbeth's blood-stained castle,—innocent Macduff intruding upon a world of sin and chaos, coming with the morning, but coming as unconscious Nemesis.

The whole of Hawthorne's description is written in a style as majestic as the scene itself; a style which for once—and it is very uncommon with Hawthorne—breaks into blank verse rhythm for two and a half lines, as if the weight of all the terrific emotion of the scene were too great for prose, and demanded the wings of poetry for a brief flight.

The greatness of Hawthorne's style is not in realistic details of manner, dialect, and minor photographic actualities, but rather in the purity and delicacy of his expression and the grandeur of his cumulative effects. That practised artist Robert Louis Stevenson said (and if we grasp the full meaning of this passage we shall be already at least half educated in literary art): "Let him [*i.e.*, the novelist] not care particularly for each man's tone of conversation, the pungent material details of the day's manners, the reproduction of the atmosphere and the environment. These elements are not essential; a novel may be excellent and yet have none of them; a passion or a character is so much the better depicted as it rises clearer from material circumstance. In this age of the particular let him remember the ages of the abstract, the great books of the past. . . . And as the root of the whole matter let him bear in mind that his novel is not a transcript of life, to be judged by its exactitude; but a simplification of some side or point of life, to stand or fall by its significant simplicity."

This is the pure classic conception of art, where the effect

is not in the realism and accumulation of detail, but is in the poise, proportion, and effect of the whole. In this day of hurried and frequently half-educated people writing "best-sellers" and magazine tales, the general public too often confounds all art with realism. Profanity and slang and dialect are all right in their place, and when a master like Kipling uses them they are used with true effect; but when a feeblar man relies on profanity and slang to give all the force to his story, the effect is generally—not art. In the Rock Creek Cemetery near Washington is one of the greatest examples of American sculpture, St. Gaudens's statue of Grief. Any accumulation of the details of realistic grief, any hysteria, would have ruined it. It is the utter simplification of one great idea—silent grief; and this is accentuated in every line of the figure, in the long, sweeping drapery; everything is there to emphasize the one thought, simple, severe, classic.

The passion of our day for realistic detail is simply killing the highest form of art in language—that is to say, poetry. A dramatist puts a scene from the Bowery on the stage with all its beer and profanity and depravity; an actress of power rages through the scene; and behold, men are so captivated by the photographic depiction of a phase of real life that they see no merit in the lofty poetic passion of Shakespeare! This kind of realism may be all right in its place, but it is certainly all wrong when it destroys our power to appreciate the high and modulated things of great dramatic art.

Hawthorne wrote in the simple grandeur of an elder time. Had he wished, he could doubtless have made sailors talk salt dialect, for he had heard enough of that kind of talk when he was weigher and gauger in the Boston custom-house. But he was more interested in showing the great passions and the great fates.

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"*The Scarlet Letter*" is the story of only three persons, but so intensely are they drawn that the novel ranks with "*David Copperfield*" and its two or three score of people. The story is not of passion, but of retribution; stroke by stroke is painted in until an almost intolerable grandeur of effect has been achieved. There are realistic details aplenty, nearly a whole chapter on Hester Prynne's needlework, but every stroke of the needle is made to stitch in the experience of Hester's soul. What an artist's touch is that to have Hester employ the best of her needlework in embroidering the scarlet "A," the letter which the law condemned her to wear as the badge and mark of her adultery and shame! Page by page, and chapter by chapter, the effect is cumulative,—the moral exhaustion of Dimmesdale, the slow recuperation of Hester, the demoniacal revenge of Chillingworth. There is no haste and no waste; all the details are realistically New England, but the result is classic Greek,—reserved, chaste, sculptured, a pure white marble statue splashed with a single ineradicable scarlet splotch. It is tonal perfection. Is it a great theme? It is the same theme we find in a thousand flashy sensational novels, and a thousand other dull realistic novels. Its greatness consists in a perfect assessment of life's values and an art competent to exhibit the inner significance of life.

By the same token, Hawthorne is able to give his characters a wonderful appeal. They are frequently unsubstantial, like the people of a dream world. Some one has said they are pictures rather than people. The child Pearl is not so much a flesh-and-blood creature as an elf, a dancing ray of light. Phœbe in "*The House of the Seven Gables*" is like a morning-glory with the dew on it, fresh, fragrant, pure. One of Hawthorne's greatest triumphs is old Hepzibah in that same "*House of the Seven Gables*." She is

sixty years old, an old maid with a scowl that frightens little children and turns adults from her door; she is gaunt, she is grotesque in dress and manners, she is almost toothless, near-sighted, stiff and creaking in her joints, so timid that everybody thinks her hostile. And Hawthorne never lets us forget these things; they are repeated, like an opera theme, whenever Hepzibah comes on the scene. And yet with it all, this most unattractive old maid, by her single-hearted devotion to her persecuted and half-crazed brother, is an appealing human figure, who, through this one absorbing devotion and emotion, is lifted out of all the ugly, sordid reality into the spacious region of fine art.

Walter Pater has a famous phrase about "burning with a gemlike flame." Hawthorne's style burns with a gemlike flame, slow, steady, at low temperature. And his style is an index to his temperament, brooding, isolated, somber. He was no pessimist, but neither was he an enthusiast. He thoroughly believed in the world's progress, but he believed it must come by very slow degrees, and he could not think that any one man is enormously important to the world. Hence there is a detachment from the hot daily interests of the world, a pensive and at times almost wan note in his utterances. He had in himself nothing of the reformer, nothing of the hot spirit of the man who is roused by a sense of evil to seek the remedy, nor of the faith in himself that he, above all men, could find and furnish the remedy. The evil which Hawthorne saw in the world is as old as the world itself, began with the fall of man, and will cease only when human nature ceases. Hence he did not write "novels of purpose." He wrote as pure artist, setting down the facts and phenomena of sin with a sure hand, appealing to the individual conscience, and appealing to it in the detached terms of high art.

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Hawthorne's is not the only form of art. Art is wide as well as long, and there is place in its many mansions for many different kinds of genius. Men with a fiercer temperament than his make fiercer and more glittering art. But in that somber gray monotone, which is his natural style, he has not been surpassed by any writer of English fiction, and in pure and high art he has not been equaled by any other maker of fiction in America.

THE LIFE AND ART OF EDGAR ALLAN POE

FEW authors present such different aspects to different minds and different moods as does Edgar Allan Poe. According to the angle of vision, he appears as a man of exalted genius or as a man of depraved imagination. But the most unsympathetic must admit that he was an extraordinary artist, and the most sympathetic must admit that his art sometimes deteriorates into artistry—that is to say, into mannerisms and tricks for spectacular effect. W. Robertson Nicoll has said that Poe is “one of the most illusive and evasive creatures in literary history.” Only an “illusive and evasive” creature could excite so much controversy and so many contrary opinions. Hardly any other English-speaking writer of the nineteenth century has been so dear to the hearts of those people who mistake controversy for criticism and literary gossip for literary appreciation. The controversies about Poe would fill a library of respectable size, and they include nearly everything that concerns his life, his character, and his work.

There have been controversies about the year of his birth, though that is now settled—1809; and hot controversies about the place of his birth, whether Baltimore or Boston, which, according to the manner of such debates, continued after it had been established by all the rules of evidence that he was born in Boston. His originality has been challenged, and there is grim irony in that, because he set an inordinate value on originality and was himself a veritable weasel in ferreting out literary plagiarisms; attempts have been made to prove that his peculiar poetic manner was “lifted” bodily from a forgotten Georgian versifier.

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His character has been dissected and anatomized in a manner that few characters could bear and remain anything worth calling character. He has been pronounced an habitual drunkard, a confirmed drug fiend, a libertine, and even a thief—this last dreadful charge because extreme poverty sometimes prevented him from repaying small loans of money, and because, it is said, he once failed to return a borrowed book—which, by the way, he did return; if all authors were pilloried for that last-named offense, authorship would be in even worse repute than it is. For a long time his name was excluded from the New York Hall of Fame because of his alleged bad habits—which was scarcely logical even if all the charges had been proved, for this professes to be, not a Hall of Morality, but a Hall of *Fame*, and, as some one pertinently asked, "If Edgar Allan Poe is not famous, who is?" On the other hand, his defenders have been correspondingly vehement and extravagant, not content to set him forth as an ordinarily honest and decent man, but seeking to establish him as a sort of libeled archangel. If departed spirits pray, poor Poe has cause to pray earnestly for deliverance from both friends and foes.

He spent much of his stormy life in quarrel and controversy, and from his death to the present time he has been the subject of controversy. He made Rufus W. Griswold his literary executor. Griswold was a litterateur whom Poe had attacked pretty severely, but Poe seemed to think that they were reconciled before his death, and that Griswold was his friend. But he reckoned without his Griswold. Apparently Griswold was not a man who easily forgave, and probably he sincerely disapproved of Poe's character. It was, perhaps, allowable for Griswold to disapprove of Poe's character, but to disapprove so hotly and at the same time to consent to be his official biographer and ostensibly

his chosen executor—this was hardly excusable. Moreover, Griswold was either too careless or too unintelligent to get his facts straight. And so the first biography of Poe was a jumble of misinformation and misinterpretation. Poor Poe was as unfortunate in his official biographer as in nearly everything else in his feverish and ill-regulated life.

For the life of Poe is the record of the disaster that must follow the neglect of self-control. It was not debauchery which destroyed Poe. Such debauchery as there was was an effect rather than a cause. He drank too much, but even a little would have been too much for one of his excitable nature, and Poe drank more than a little. There would be months and even years of abstinence, but again he would succumb to drink from unhappiness, and alas! sometimes from insufficient nourishment, for it may cost less money to get drunk than to eat enough. Sometimes he took drugs, and he was just the sort of man who should have preferred to die, to go insane, to do anything rather than touch an opiate. Narcotics are bad for anybody, but ruinous to one who feels the need of them as much as did Poe. He was indiscreet in his relationships with women, but—and this should be emphasized—all the fine-tooth combing of his career has failed to show that he was immoral in his relationships with women. To deny that Poe was dissipated is to speak falsely, but to assert that his misery was the direct result of dissipation is to confuse cause and effect. His misery was the cause of his dissipation, and both were the results of undirected energies and an undirected life.

His tempestuous nature needed an excessive amount of discipline, and he got very little discipline. That, as I see it, is the supreme tragedy in the character of Poe. The more one sees of life, the more clearly must he realize that much of its stormiest tragedy, as well as its mere ineffectuality, is

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due to lack of training, lack of discipline, lack of control. Men hold God and Fate responsible for that over which God never has and never will assume responsibility, the training and directing of the powers that He gave. Common charity inspires pity for the intense and feverish temperament which was Poe's inheritance, not his fault, and the same pity for all the unfortunate lack of wise care, which, again, was not his fault but his misfortune. But it would be mere sentimentality to excuse Poe himself from all responsibility, for he refused to accept the opportunities when they were offered. At the University of Virginia, and later at West Point Academy, there was proffered just what he needed, mental training and discipline of character, and he wilfully flung it all away, broke bounds, and ran his own wild course whither it led him. For that Poe must stand judgment in the calm wisdom of men.

Poe's father was, of course, a member of the distinguished Baltimore family, but a ne'er-do-weel son of a father who disinherited him for his escapades, which culminated in his going on the stage. This David Poe married an English actress, a woman of fine character and much charm, but pursuing a profession which in those early days in America had small reward and less honor attaching to it. Three children were born of this marriage, and they were all virtually babies when their parents died. The orphans were scattered, and Edgar was adopted by Mr. and Mrs. John Allan of Richmond, Virginia, who gave him their surname for a middle name. Mr. Allan was a man of wealth, in the tobacco business on a large scale, and indulged the child in many things, including travel, and five years in an English school, where the lad got the impressions he afterward used in describing the school of "William Wilson." In view of the sequel, it was careless, if not worse, for Mr.

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Allan to set the six-year-old child on the table to pledge the health of guests in wine; and then one remembers how, when Edgar was yet younger, a babe in arms, the old Welsh nurse, who attended the actor's children in their garret home, would quiet them in their restlessness by feeding them bread soaked in gin.

On his return to America the boy completed his preparation for college, at school and with private tutors, and at the age of seventeen he entered the University of Virginia. Here, by cleverness rather than industry, he stood well in Latin and French, and here he drank, as all Virginia students drank in 1826, but, it is explicitly stated, not more. And here he gambled, as most students gambled then, but much more. So much more that Mr. Allan was outraged, took him from college, and put him in his office. Here, in confinement and unhappiness, Edgar broke down in health. Then he left Mr. Allan's home and became a wanderer, friendless and practically penniless. He went to Boston, inveigled a young printer into publishing a book by him, a book of poems, his first, things in the gloomy manner of Byron. Then he enlisted in the army under the name of Edgar A. Perry, served for about two years, rose to the rank of sergeant-major, procured his release through Mr. Allan, and on the same gentleman's rather cold recommendation was appointed a cadet at West Point, grew weary of that, and by deliberate neglect of duty got himself court-martialed and dismissed. Amid all these adventures he contrived to get two other books of poems published.

He was now quite alone in the world, for Mrs. Allan had died, and Mr. Allan had married again and was done with the headstrong youth. Poe went to Baltimore, and here he wrote his first story, in competition for a hundred-dollar prize offered by the "Saturday Visiter." The story was "A

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Manuscript Found in a Bottle," and it won the prize. Probably none of the contestants needed the money so much, for Poe was in rags and all but starved. But he had found his profession—literature. He joined the staff of "The Southern Messenger," published at Richmond. From Richmond he went to Philadelphia, where he was editor, first of Burton's "Gentleman's Magazine," and afterward of "Graham's Magazine," which under his management became the best known literary journal of the day in America. From Philadelphia he went to New York and was on the staff of the "Evening Mirror," and later of the "Broadway Journal." For these various papers he wrote the great mass of his stories and essays, but the money returns were small, and when his contributed articles were collected into books, the books did not sell.

Poe made many enemies, the worst of whom was himself. He had the irritability of genius to an exaggerated degree, and most of his business arrangements broke up in violent quarrels. He was proud, imperious, quick to anger, moody, reserved, and he had the dreadful fault of looking for the cause of his unhappiness everywhere except in himself. He blamed his circumstances, his fate, his associates, but not himself, to whom chiefly his misfortunes were due. He was one of the most brilliant men of his generation, and he knew it too well, and had a contempt for men of duller minds. The quality of the greatest of all genius he entirely lacked,—the humility of genius. And he lacked another important quality, humor—that humor which enables a man to laugh at himself, and sometimes by laughter to produce a better self. If one cannot have the grace of God in his heart, he should try for a sense of humor.

This lack of geniality, of humor, and of sweet humanity is betrayed in Poe's writings. They reveal an extraordinary

brain and a startling imagination, but they do not disclose a personality. The charm of literature is chiefly the result of charming personality, and Poe's writings, with all their power and fascination, lack charm. It is at this point that Hawthorne and Stevenson, with whom it is so natural to compare him, surpass him. The writings of those men discover nothing more delightful than themselves. The personality of Hawthorne was somber, but gentle, tender, and loving; the personality of Stevenson was gallant, gay, debonair, loving and lovable. But in Poe's writings no such personality is encountered.

With all of this, however, there was another side to Poe, practically never betrayed in his writings, and seldom shown in his life, to men, though often to women. Mrs. Francis Sargent Osgood, who knew him well, wrote thus of him: "I have never seen him otherwise than gentle, generous, well bred, and fastidiously refined. To a sensitive and delicately nurtured woman there was a peculiar and irresistible charm in the chivalric, graceful, and almost tender reverence with which he invariably approached all women who won his respect. It was this which first commanded and always retained my regard for him."

There were two women who saw more of this side of Poe, and saw it more constantly, than did any others: one was his wife, and the other was—let the comic paragraphers take note—his mother-in-law. The devotion of these three was the most beautiful and touching thing in Poe's life, and also one of the saddest, because of the women's forbearance with poverty, and because of the long and cruel illness and early death of the wife.

If we are to believe a rather nebulous story, Poe was very much in love with a girl named Mary who lived in Baltimore. This was just after he had been dismissed from

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West Point. There was a quarrel, and Poe wrote some bitter Byronic verses upon woman's fickleness, entitled them "To Mary," and published them in a Baltimore paper; whereupon Mary's uncle, an elderly gentleman, undertook to hold Poe to account; whereupon Poe thrashed the old gentleman, and threw the whip at Mary's feet with a truly Byronic gesture of scorn. But previous to these tropical proceedings, and while the course of true love was running fairly smooth, Poe used to write the customary notes to Mary, and send them by his little cousin, Virginia Clemm, a beautiful child, ten years old.

Virginia, at any rate, is entirely authentic, whether the Byronic and theatrical story of Mary is or not. Virginia was the child of Mrs. Maria Clemm, a sister of Poe's father. This lady was in straitened circumstances, and to support herself and her little daughter took in lodgers and did dressmaking. But Mrs. Clemm was not too poor to give a home to her impoverished young nephew, and so the young man of twenty-odd and the little girl were under the same roof. When Virginia was twelve years old Poe took out a license to marry her. This was violently opposed by a male relative, but fully consented to by Mrs. Clemm herself. It is uncertain whether a marriage took place at that time, but two years later, when Virginia was fourteen, they were publicly married in Richmond, Poe being then twenty-seven years of age. From that time until Virginia's death, these three lived together in beautiful devotion, though in such stress of poverty that at intervals Mrs. Clemm had to take boarders to keep the wolf from the door. One night, when they were living in Philadelphia, Virginia while singing burst a blood-vessel and all but died. She partly recovered, but remained an invalid, watched over by her mother and husband for the rest of her broken life, in Philadelphia,

in New York, and in the little cottage at Fordham,—the little cottage that has become so famous,—where she finally died.

Only a little less famous than the cottage is the letter in which Poe related to a correspondent the tragedy and all that it meant to him—a statement not at all exaggerated, as the evidence goes to show. It was written less than a year after Virginia's death, and a little over a year before Poe's own death, a worn-out and broken man: "Six years ago, a wife whom I loved as no man ever loved before, ruptured a blood-vessel in singing. Her life was despaired of. I took leave of her forever and underwent all the agonies of her death. She recovered partially, and I again hoped. At the end of a year the vessel broke again. I went through precisely the same scene. . . . Then again—again—and then once again, at varying intervals. Each time I felt all the agonies of her death—and at each accession of the disease I loved her more purely and clung to her life with more desperate pertinacity. But I am constitutionally sensitive—nervous in a very unusual degree. I became insane, with long intervals of horrible sanity. During these fits of absolute unconsciousness I drank—God only knows how often or how much. As a matter of course, my enemies referred the insanity to the drink, rather than the drink to the insanity."

Thus Poe's own experience brought home to him what he held to be the most melancholy and at the same time the most poetic of things. In his essay on "The Philosophy of Composition" he had written, "The death of a beautiful woman is unquestionably the most poetical topic in the world." This had been the theme of much of his best poetry and many of his best tales—"The Raven," "Ulalume," "Lenore," "Annabel Lee," "To Helen," "Ligeia," "Berenice,"

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"Eleonora," "The Fall of the House of Usher," and others. Most of these were written before Virginia's death.

The lady who haunted the waking dream of Poe was not his wife, was not any actual woman who had ever been, but was an ideal, a Platonic idea, though probably the idea was suggested to his intense and tenacious imagination by an experience of his boyhood. Here is the story as told by others: "While at the academy in Richmond, he one day accompanied a school-mate to his home, where he saw for the first time Mrs. H. S. [really Mrs. Jane Stith Stanard], the mother of his young friend. This lady, on entering the room, took his hand and spoke some gentle and gracious words of welcome which so affected the sensitive heart of the orphan boy as to deprive him of the power of speech, and for a time almost of consciousness itself. He returned home in a dream, with but one thought, one hope in life—to hear again the sweet and gracious words that had made the world so beautiful to him. . . . The lady afterward became a confidante of all of his boyish sorrows. . . . She died, and for months after her decease it was his habit to visit nightly the cemetery where the object of his boyish idolatry was entombed."

Thus to this excitable boy, at the most impressionable of ages (he was fourteen), came the experience which is reflected in so much of his writing, beauty and death, a woman's soul and the tomb. For his theme is not love, warm and life-giving, but the death of the loved one; and yet so often with the intimation that death does not and cannot "dissever the soul from the soul" of the loved object. One of Poe's editors goes so far as to call this the "dominant idea" in Poe's work,—the idea of "Ligeia,"—the idea that the human spirit may remain in the world after death.

It is not religion, it is not the Christian's hope of immor-

talities. It is purely psychic, and it is connected with all the moldy circumstances of the grave, with all the shiver of ghosts, with all the eeriness of the graveyard, of moon mists, of sheeted forms, and the hushed tones with which people recite strange and unlawful things after the clock has tolled midnight. The haunting terror in Poe's tales has to do, not with the spiritual mystery of death, but merely with the effect on mortal mind of mortal's contact with the phenomenon of death. He sends the icy currents down our spines, not with descriptions of awesome objects, but with the effect of these on the human mind. None, unless it is Maupassant, has described fear so fearfully.

The "effect" was the thing which absorbed Poe in literature, because he was pure artist and regarded it as the purpose of art to produce certain calculated effects on spectators and auditors. He was a self-conscious artist—that is to say, he was a man, like his master Coleridge, with clearly defined theories as to how art should be expressed. As magazine editor and critic he had occasion to write numerous reviews of contemporary authors, including many in America; and while some things that he wrote were ill-judged, some ill-tempered, some too lavish of praise, some too emphatic in condemnation, the general effect of his critical writings was good for America in the 1830's and '40's.

From Poe more than from any other one person, America learned the important lesson that literature is a fine art, and that its main purpose is to give pleasure. Poe vehemently opposed the idea current in America, and to some extent in England, that literature should be didactic, that it should have for its main purpose a lesson, intellectual or moral.

Poe was right, even though we admit that he pushed his theory too far. America was flooded with books of useful information, which were usually books of useless misinfor-

mation, and books of moral teaching written by men so intent on a good moral that they could not tell the truth. It would have been a dreadful thing in the conception of the typical maker of books in America in the first half of the nineteenth century to state the plain fact that George Washington got very angry and cursed one of his generals at Monmouth battle. To record that would have been contrary to good morals, for in this conception of literature and morality, truth and morality had very little to do with each other. The hotter the war on that sort of book-making, the better it is for everybody concerned, and perhaps Poe deserves no more hearty thanks from us than for the service he rendered in calling attention to the fact that it is not the sole purpose of books to teach moral lessons. Equally is it true that when Poe was writing there was almost nothing of pure art in America outside the writings of Washington Irving and Hawthorne.

Poe's error in practice was the result, not so much of his theory, as of his temperament. He might have learned from Hawthorne, whose work he sincerely admired, that it is entirely possible to write as pure artist, and at the same time to clarify the reader's thoughts about the most important of all human business, the business of right living. Hawthorne, like Poe, instinctively perceived that the prime purpose of literature is not to teach moral lessons, but to give that high and grave satisfaction which comes from art. But he also saw that, all other things being equal, that art is greatest which draws its material from the fundamental things of life; that the law of art and the law of truth are the same; that the law of art cannot be different from the law of life on which art is based; and that the law of life is that it is impossible for men to escape the consequences of their deeds. Hawthorne did not create Dimmesdale to admonish

us against adultery, and Donatello to warn us against murder, and Colonel Pyncheon to counsel us against injustice. Hawthorne simply based his art on the eternal and important truths of life, and then he left the readers to do their own moralizing. The inhibitions we get from these cases are entirely a matter of our own applications, of our own consciences attesting the truth of Hawthorne's pictures.

Poe was not interested in the important and eternal truths of life, but rather in some secondary truths, such as the nervous phenomena accompanying physical fear. The editor of the collection of Poe's tales in the "Everyman" edition puts the matter so well that it is useless to try to state it better: "The whole of Poe's imaginative work, his verse as well as prose, . . . is marginal, not central; it comes, not out of the main way of life, but out of the border of existence. Poe gives us experiences that are on the margin of sanity or on the border of unconsciousness."

Hawthorne was also interested in psychic phenomena, and Dimmesdale has mental experiences which would have delighted Poe's imagination had he lived to read the novel. But these psychic phenomena are incidental to a larger and deeper experience that Dimmesdale is having, the experience of a soul lacerated with the consciousness that he has violated his own principle of right, has transgressed the laws of God and man.

Or again, one might compare Poe with Stevenson—say the story of "William Wilson" with the story of "Markheim," both studies in that "other self," that mysterious, importunate, inescapable person who walks with us in all our walking, who haunts our thoughts by day and our dreams by night, who may sometimes announce himself to us as "conscience," sometimes merely as "subconscious self," but who, under whatever alias he travels, gives man all the

evidence he needs that, no matter how much other theology the world has outgrown, it has not outgrown and never can outgrow the truth of the doctrine of hell. Both Poe and Stevenson were interested in the mystery of the subconscious self. But Poe's interest ends with the scientific mystery, whereas Stevenson's interest passes from that to a consideration of the moral aspects of the case, as, for instance, the great and terrible fact that if a man persistently indulges his weaker and baser self, the time must come when he will be entirely possessed by that self, when he will become incapable of doing good, though he may earnestly desire to do good.

The sympathetic reader is entertained by the stories of both Poe and Stevenson, but the effect of Poe's story ends with entertainment, whereas after perusing Stevenson the reader falls to thinking of his own estate, and that pet foible which he has been pampering, and perhaps he shudders, and perhaps he takes a resolution. That is what Aristotle meant by his famous saying that great tragedy "purifies" us by "fear"; but Poe once wrote, in effect, that Aristotle did not know what he was talking about.

Suppose these three men—Hawthorne, Stevenson, and Poe—were going to write stories about a woman who in a sudden fit of rage committed a murder and then fainted. All three would describe with psychological truth and power the sudden metamorphosis of the woman by the mania of anger. Then Hawthorne would in a single phrase, an indirect phrase, let us know that the murderous blow had been struck, not dwelling on the physical fact at all. From that he would pass on to show the sudden reaction in the woman's emotions, so sudden that she fainted. Then he would bring her back to consciousness, and proceed, by the most deliberate narrative, to show how the memory of her crime

never left her throughout the remainder of her life, how her nature was slowly transformed, perhaps a steady degeneration into hopeless moral degradation and ultimate insanity, perhaps (as in the case of Hester Prynne) a slow purification by suffering; and Hawthorne would be sure to let us see that the suffering begotten by this crime was not confined to the committer of the crime, but that others also were involved in the consequences; for, as he himself has said, "Every crime destroys more Edens than our own."

Stevenson would describe the blow vividly and in detail. The sickening sound of the cudgel striking the flesh, then the sprawling limbs of the prostrate body, the contortions, the quivering and twitching nerves as life slowly departed. Then he would show the frenzy of horror in the woman's mind; then her collapse. Then he would bring her to, bewildered, catching pin-point gleams of consciousness, like light coming through a heavy curtain; then slowly—very slowly—she would begin to remember what it was that she had done, all with a sense of unreality, a thought that it was not she, could *not* have been she, who had done this thing; that it was all the delusion of a dream, a hideous nightmare from which she would presently awake. Then there would probably be strange touches of incongruity, a temptation to laugh, an almost irresistible impulse to rush out into the street and shout her crime aloud so that all the world might hear. Other reactions would ensue, and there would be all the agony of concealment, the doom of living the rest of life with the consciousness that there was a skeleton shut up in the closet.

Poe would be less calculable in his mere narrative because he had different narrative styles; therefore he might tell of the blow as vividly as Stevenson, or he might describe it in a plain phrase as dry and matter-of-fact as Defoe's style.

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(The opening paragraphs of "The Gold Bug" and "The Fall of the House of Usher" form an interesting study in contrast: the first is a simple statement introductory to pure narrative, the second is shot through with impressionism introductory to a story of inward experience.) But after the blow had been struck there is little doubt as to how Poe would proceed. The woman would begin to faint; seconds and fractions of seconds would be prolonged like hours, and slowly, stage by stage, Poe would relate what was going on in the woman's brain, as consciousness by degrees grew less and less until there came the blackness of oblivion. Psychically, this prolongation is quite true, for it is a commonplace of life that in moments of supreme excitement time elongates itself, and in the tick of a watch one in great mental agitation will think of more things than he could recall in a normal day. The power of Poe is in depicting these mental states so that they seem entirely true, entirely typical of human minds in distress. But with the last gleam of consciousness, with the lapsing of the woman into oblivion, the story would end. It was that mental process that interested Poe, not the moral experiences that follow the awakening.

But psychics and personality are different things. Poe had extraordinary power of analyzing mental conditions, but practically no power of creating human beings. His admirable stories of crime are based on certain well-defined theories as to how human brains in general work. In one of the best of these, "The Purloined Letter," he has the great detective Dupin explain his method, by the parable of a boy, whom he once knew, who was clever at winning marbles on a rationalized theory of the way different human minds work. Dupin is describing a game called "Even and Odd": "This game is simple and is played with marbles. One player holds in his hand a number of these toys, and de-

mands of another whether that number is even or odd. If the guess is right, the guesser wins one; if wrong, he loses one. The boy to whom I allude won all the marbles of the school. Of course, he had some principle of guessing, and this lay in mere observation and admeasurement of the astuteness of his opponents. For example, an arrant simpleton is his opponent, and, holding up his closed hand, asks, 'Are they even or odd?' Our school-boy replies, 'Odd,' and loses; but upon a second trial he wins, for he then says to himself, 'The simpleton had them even upon the first trial and his amount of cunning is just sufficient to make him have them odd upon the second; I will therefore guess odd.' He guesses odd, and wins. Now, with a simpleton a degree above the first, he would have reasoned thus: 'This fellow finds that in the first instance I guessed odd, and in the second he will propose to himself, upon the first impulse, a simple variation from even to odd as did the first simpleton; but then a second thought will suggest that this is too simple a variation, and finally he will decide upon putting it even as before. I will therefore guess even.' He guesses even, and wins."

This theory of what we might call psychological types is what makes the "detective stories" of Poe the classics that they are, and of course all the world knows that Poe practically invented this type of fiction. His lack of dramatic ability was itself a negative assistant to him in making these stories so excellent, for the best detective stories really have nothing to do with personalized character. We are not in the least interested in the emotions of these puppets of crime and its detection; we are interested only to see the ingenious puzzle worked out, and the admirable Mrs. Anna Katherine Green, and the author of the "Mystery of a Hansom Cab," and all that multitude of public entertainers, have no excuse

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whatever for their attempts to enlist our sympathy in the "hearts" of their marionettes, except it be to pad their stories and make them longer. They are excellent, these authors, so long as they keep to their real trade—puzzle-making; they are preposterous when they invade the precincts of personality. Poe had not the power of creating personalities, and he had too much the instinct of the artist to attempt what he could not do, with the result that his stories of crime, admirable in so many other ways, are also admirable in keeping our undivided attention on the mystery and its solution.

All the cleverness and psychics of Poe did not produce personality,—could not. For a story of crime, it is proper to assume that a mind will work in a certain way, as the boy assumed it in his game of marbles, but the interesting thing about human life is that real people are continually doing the irrational and incalculable thing, the thing suggested not by their reason but by their emotions, and emotion is seldom logical, emotion declines to be typified.

Of course every human being is to a certain degree "a type." Hamlet was a type,—a type of man afflicted with melancholia and hysteria. It was "typical" for Hamlet to meditate suicide, for so melancholiacs do. It was "typical" for Hamlet in moments of excitement to break into "wild and whirling words," for so hysterical people do. But those brief cryptic sentences in which we first hear Prince Hamlet respond to the solitudes of King Claudius ("a little more than kin and less than kind"; "not so, my lord, I am too much i' the sun") are not typical. Those veiled sarcasms, so light, so baffling, so detached, were a part of Hamlet's individuality. And all through the play Hamlet blends individual peculiarities with typical qualities, with the result that he is the most created character in all English literature.

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He is so entirely an individualized human being that we know him just as we know our best friends. We know him so well that we cannot explain him, which is exactly our experience of our friends, unless perhaps they are very simple-minded friends. You can explain a type, but you cannot explain an individual.

Poe's creations are not personalities; they are adumbrations of the processes of the human mind in emotion. This is not said in the way of critical disparagement, but rather as critical exegesis. Poe was not trying for the dramatic in the sense in which "dramatic" means individualization. He was a teller of tales, a practitioner of one of the most ancient of the arts. In the tale, stress is laid on incident; in the dramatic story, on the personalities of those who figure in the incident. Poe's art is the art of Boccaccio, not the art of Balzac.

And if we catch the point of all of this, there is nothing contradictory in the fact that this most emotional of men was also most intellectual and critical. He who was so fond of working out all manner of puzzles, games, "ciphers," committed crimes, etc., had the same curiosity about the mystery of the human brain in excitation.

Even his gospel of art is an intellectualized gospel. A poet like Keats was satisfied with the gospel of art for its own rapturous esthetic sake, but Poe must logically analyze the constituent elements of the arts, and find a metaphysical basis for their effects. His dicta on the short poem and the short story (that long stories and long poems are contradictions in terms, that all true literary art must be art in brief) may not be convincing as abstract theories, but when we read the results in "The Fall of the House of Usher" or "Ullalume" we see that the theory in practice could produce some fascinating results.

Poe's theories, and therefore his practice when that practice is at its best, may all be referred back to his principle of "effect," always a calculation of the reader's reaction to the author's intent. So his ideal was to produce on his reader one single effect in a composition, to strike the note of that effect in the opening paragraph, and then to admit no element that would in any way jar on or diminish that effect. In accordance with this rule he wrote such little masterpieces as "Ligeia," "Silence," "The Masque of the Red Death," "The Fall of the House of Usher," and many others—prose poems, perfect in atmosphere, rhythm, and unity of impression.

The hardest thing to say about Poe is the thing which I have reserved for the last, a thing which offends some of his devoted admirers, and yet a thing which is surely entirely true,—that, with all his passion for art and all his study of words, he never arrived at that consummate grace of style which makes the greatest masters in verse and prose. Possibly it was because he was so intent on getting his effects that he made the effects sometimes more obvious than artistic; for instance, "The Bells" is a fine medium for elocutionary gymnastics, but hardly a great poem. The onomatopœia is too pronounced—it "hits you in the face"; Tennyson's

"moan of doves in immemorial elms,
And murmuring of innumerable bees"

is better poetry than all of "The Bells," and yet better poetry than those lines of Tennyson has been written, for, after all is said, these things are tricks. In short, Poe was so intent on his effect that he was sometimes affected, so absorbed in his art that it sometimes became artistry.

There is pathos in the thought of the artistic limitations of Poe's surroundings, limitations which we must believe

reacted on the man's art. The commentators, like Baudelaire in France and Stedman in America, emphasize Poe's esthetic isolation in the America of 1840. That sensitive soul, vowed to one fidelity only,—the religion of beauty,—found more to irritate than to stimulate in his environment. Mr. Stedman patriotically observes that England in the same period was almost as non-esthetic as America, but no Englishman could have been so banished from the realm of beauty as was Poe in America. At least, the Englishman could have escaped from the region of wax flowers and horse-hair furniture and keepsake poetry, and could have gone to see what other Englishmen had done in bygone centuries,—those who built the castles and cathedrals. Poe could not do this. The Englishman lived in a *finished* country, Poe in an unfinished. The crudity of America, which stimulated Walt Whitman, irritated Poe, would have made him dumb had he been less energetic of mind. There was little architecture, less music, no painting, and almost no literature to feed the hungry soul of this aspirant for beauty. There was one thing,—untamed nature,—good for a Byron, not so good for a Poe.

Poe was the apostle of beauty amid crudity, and one must believe that the result is seen in his work, where sometimes the craving is more apparent than the satisfaction. In his descriptions of interiors there is sometimes more display of decoration than good taste; in his phraseology there is more display of learning than delicate allusion; and too often in his style there is more display of rhetoric than illusive charm. Poe's style was frequently a remarkable instrument, but seldom a delicate instrument. If he were writing to-day, it is entirely certain that he would write some things differently, and practically certain that he would write many things better.

But when all this is said, the fact remains that he did as much, if not more, for beauty in America than any other literary man of his day, certainly more than any one outside of New England. He was a missionary. It probably would have surprised him to hear it said, for one fancies that Poe did not have a great enthusiasm for missionaries, but so his life was planned by a power not his own. And furthermore, the fact remains that in a somewhat restricted region—the region of the prose tale and the region of the psychic thrill—his work surpasses anything that has been done in America. He has taken his place, an assured place, in the admiration of foreigners. When the Frenchman thinks of American literature he thinks first of Poe, and frequently imitates him. When the Englishman thinks of American literature, he also is very likely to think first of Poe. A man of extraordinary endowments whose gifts were never trained, a man of keenest esthetic instincts whose instincts were almost starved, a man who accomplished very great things but who leaves the impression that under more fortunate conditions he would have accomplished yet greater things—such is part of the tragedy of Edgar Allan Poe, in whose life and career nearly everything was tragic.

THE SPIRIT AND ART OF ROBERT LOUIS STEVENSON

IT was by his spirit and his art that Robert Louis Stevenson achieved his great distinction in nineteenth-century literature. He wrote essays full of matter and stories full of entertainment, but it is the spirit of the essays and the art of the stories that have distinguished them above the work of many other essayists who are as thoughtful and many other novelists who are as entertaining. Essays more profound and novels more illuminating to life and society have been written by people far less famous than Stevenson, but those writers failed to catch the popular imagination as he did because they had not his spirit or they had not his art.

I am not treating Stevenson historically now. That may be left to the future historian of nineteenth-century literature, who will find that Stevenson has an important and permanent place in the history of nineteenth-century English literature, because he did more than any other one writer to expel from English literature the depressing pessimism of the latter nineteenth century, and to reintroduce into fiction healthy activity in place of morbidity and triviality. But Stevenson is too near our own time to be regarded merely as an historical influence. He is still a vital influence among readers who read, not merely to be instructed, but because they want to be entertained and because they want to be helped by one whose writings have been helpful to men. By his gallant spirit Stevenson continues to help many who need help, and by his cunning art he continues to entertain many who crave entertainment. It is not the depth of his thought,

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but the vivacity of his thought, which helps most. It is not the mere adventure, but the art with which he relates the adventure, that makes his stories enduringly entertaining.

Stevenson's spirit was the spirit of a brave man, of an absolutely brave man, of an absolutely and cheerfully brave man. All that means a good deal; there are many brave people in the world, but not all of them are absolutely brave, and yet fewer are consistently cheerful in their courage. To be as brave as Stevenson two things are necessary: first, that a man be constantly in peril, and secondly, that he be gallantly indifferent to his peril. That was the spirit of Stevenson—gallantly indifferent to peril that was never absent. In this glad world there are many people who are always healthy and always singing at their work. In this sad world there are many people who are always ill and yet too brave to murmur. But Stevenson was always ill and always singing. We feel that a well man should always work and always be cheerful about his work. We feel that a sick man should rest, but that he ought to be patient and resigned. But when we find a sick man always working and always radiantly cheerful in his work and suffering, we find the rare exception—we find Robert Louis Stevenson.

He was an invalid all his life, seeking the wide world over, from the wintry Orkney Islands to the perpetual summer of the South Pacific Islands—seeking, not health, but merely a place where he could live and do his day's work—and always brave and cheerful, always heartening others with his eager friendship and his writings.

He was ill from infancy, probably inherited from his mother a weak chest and a nervous system too highly strung for placid peace. Poor health prevented systematic schooling, though he attended different schools of Edinburgh in a desultory way. Poor health prevented assiduous study at

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Edinburgh University, though he was an omnivorous reader. Because a pedagogue is writing this essay, a dull little moral is due just here. The charming essay "Some College Memories" warns students against too much study, advising them that health is more precious than learning. It is right counsel so far as it goes, but it is not desperately needed in most latitudes. In twenty years of teaching I have known only one student to break down from too much study,—and it was dreadful and all wrong,—but I have known several thousand who did not break down from over-study.

At the university Stevenson took the course in engineering, intending to be a lighthouse engineer, like his kinsmen and forebears. He did sufficient work to get a medal for a special paper on lighthouse improvements, but his health was too frail for him to practise the profession, and he had a serious breakdown not long after graduation. So he studied law, and at twenty-five was admitted to the bar, but never practised. Then he had a few years of tolerable health and was busy writing, studying Scottish history, contributing essays to the "Cornhill Magazine" and his first stories to "Temple Bar" magazine. At twenty-nine he had broken down again, and, at San Francisco and Monterey, seemed about to die. But he rallied and was married instead—to an American lady, Mrs. Fannie Van de Grift Osbourne. They went for health and a honeymoon to a deserted mining camp near Calistoga, and out of this visit Stevenson afterward made a book, "The Silverado Squatters."

The marriage had not pleased Stevenson's family, who were Scotch Presbyterians and therefore suspicious of marriage to a divorcée; but after a while they were reconciled, and Stevenson took his wife to the parental home. Scot-

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land's is not the climate for diseased lungs, and it was now manifest that Stevenson was chronically ill of tuberculosis. For eight years his life, as his biographer says, "seemed to hang by a thread." But his courage never failed. He traveled from health resort to health resort on the Continent, back to Scotland and to England in the intervals, writing, writing all the time, and gladdening with his radiant spirit those with whom he came in contact.

Doubtless the death of his father, whom Stevenson loved and honored with even more than usual filial affection, made it comparatively easy for him to take his mother and his wife finally away from Scotland; for, though he was a loyal Scotsman, he never relished the Scottish climate. So he started for Colorado, but, on landing in New York, was persuaded to go instead to the Adirondacks, where he spent a winter at Saranac, very busy with some fiction that has become famous,—*"The Master of Ballantrae,"*—and with some no less famous essays written under contract for *"Scribner's Magazine,"* including *"The Christmas Sermon,"* an essay which is likely to be read as long as people read English. In June, 1888, Stevenson, being thirty-eight years of age, embarked on a yachting tour of the South Seas with his family, S. S. McClure having provided funds, in return for which Stevenson was to write letters of travel for the McClure Company.

There were some two years of travel in the Pacific seas, visits to Hawaii and the leper settlement at Molokai, which gave rise to that scathing piece of righteous indignation, the letter in defense of Father Damien, who had given his life to the lepers and whose character had been aspersed by one who should have known better. There were visits to other and remoter islands, adventures amusing and thrilling, and finally in 1890 Stevenson settled down for four years—his

last four years—in Samoa, where he purchased a home, became a sort of feudal chief, and was all but adored by the natives, who called him “Tusitala,” meaning “Teller of Tales.” He took an active part in Samoan affairs, exposed the incompetency, or worse, of the representatives of the three powers (the United States, Germany, and England), had these officers dismissed, and while never himself the accredited agent of the powers, he became the spokesman of Samoa to the world at large. Indeed, for most of us Robert Louis Stevenson *is* Samoa. He and a certain hurricane have made for us an actual place of what would otherwise be a fly-speck on the map of the Pacific Ocean.

One afternoon late in 1894, about a month after his forty-fourth birthday, he was laughing and talking in his gay manner with his wife, when suddenly a startled look crossed his face and he fell at her feet. A blood-vessel had burst in his brain, and two hours later he was dead. It has been said that Robert Louis Stevenson died of good health. His general condition had greatly improved, his blood had become so enriched in volume and quality that the vessels, weakened by long illness, were not strong enough to bear the pressure.

I have never regarded myself as belonging to the Stevenson “cult,” that inner circle of the devout, who, as has been said, rate literature with “Stevenson first, Shakespeare a poor second, and the Bible hardly a poor third.” But I shall never forget the December afternoon when I was hanging on a strap in a New York elevated railway train, and, unfolding my paper, read that Stevenson was dead. The world suddenly seemed empty, like a house from which the one most loved has moved away.

Sixty Samoan natives cut a path through the forest on Mount Vaea, and to the mountain’s top they bore his body,

and on the mountain top they buried him, as he would have wished it, for so he had sung it in "Requiem":

"Under the wide and starry sky
Dig the grave and let me lie.
Glad did I live and gladly die,
And I laid me down with a will.

This be the verse you 'grave for me:
'Here he lies where he longed to be;
Home is the sailor, home from the sea,
And the hunter home from the hill.' "

As the reflective man gets older he realizes that some of the wisest things are said by people with no special reputation for cleverness, who merely sum up life's experience in a colorless phrase. As daylight reveals the object without attracting attention to itself, so their simple language leaves us nothing to think about but the thought itself. Not long ago I was with some companions in a railway station. In another group stood an elderly woman surrounded by her friends. She was starting for New York, where an eminent medical specialist was to make a final examination which in all probability would result in a verdict of certain death from a terrible disease, but she was laughing and chatting as cheerily as if she were starting on a pleasure trip. Then a member of my party, a woman who set up no claim to cleverness, said, "After all, it is really easier to be entirely brave."

That is the text. To be partly brave is to be sometimes troubled by fear; to be entirely brave is to be never troubled by fear. To be partly brave is to be sometimes depressed; to be entirely brave is to be joyous with a lyric joy. Men

who lead complex human affairs and human struggles understand this; to be only sometimes brave means sometimes to compromise, and compromise always means trouble; to compromise nothing is to be always on solid ground and at ease. So if a man is merely looking for the easiest way, he should be always entirely brave; but a man who is always looking for the easiest way has not enough manhood to be entirely brave. Therefore, we must turn the proposition around: the man who is entirely brave finds that he has hit upon the easiest way. That was Stevenson: he was so brave that he found the way easy—joyous and songful.

Gilbert Chesterton says: "Stevenson did not face his troubles as a Stoic, he faced them as an Epicurean; . . . his resignation can only be called an active and uproarious resignation. . . . Stevenson's great ethical and philosophical value lies in the fact that he realized this great paradox, that life becomes more fascinating the darker it grows, that life is worth living only in so far as it is difficult to live. He discovered that a battle was more comforting than a truce."

It was in this spirit that Stevenson met life and found its meaning and stated that meaning in one sentence, which is the key to his philosophy: "We do not, properly speaking, love life at all, but living." That sentence is from the essay "Æs Triplex" ("Triple Brass") in "Virginibus Puerisque," an essay that every man and woman should read, because it tells us how to meet death by being so occupied with living that we have no time to fear death, or even to think about it.

It was to the advantage of this philosopher and his readers that he who could live so bravely could also write bravely, that he had a gift of expression as gaily confident, as insouciant and gallant as his own courageous heart. In Stevenson's style, or styles,—for indeed he is a man of many styles,—there is a special fulfilment of the French definition

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of style: "The style is the man." The light and variable quality of the man, the versatility, the grace and ease, and withal the combination of sobriety and verve, are all reflected in his literary styles.

This "Æs Triplex," like many other things he wrote, is fine literature both because it says something important and because it says it in a rarely attractive manner. This and many other essays of Stevenson fulfil that conception of literature which he expounded in his essay on "Walt Whitman": "Any conviction, even if it be a whole system or a whole religion, must pass into a condition of commonplace, or postulate, before it becomes fully operative. Strange excursions and high-flying theories may interest, but they cannot rule behavior. . . . It is not by forcing him on from one subject to another that the man will be effectually renewed. He cannot be made to believe anything; but he can be made to see that he has always believed. . . . If any ideal is possible, it must be already in the thoughts of the people."

Obviously on this theory of literature—and it is surely an entirely correct theory—the literary form is extremely important. For if the author says merely what is in the subconscious thought of everybody, he must manifestly say it better than most people can say it, in order that he may bring it out of the subconsciousness into the active consciousness as a principle of living. It is the author's way of saying a thing which suddenly makes us realize that we ourselves have often vaguely thought the same thing, but never before realized its significance because we never put it into words.

Then Stevenson proceeds to say: "Whitman is alive to all this; he sees that if the poet is to be of any help, he must testify to the livableness of life." So, according to Steven-

son, this is the manner of literature, to compel men by the aptness of literary expression to see what it is that they have been vaguely believing all their lives; and its object is to show that life, with all its unsatisfactoriness, is a very livable thing.

Those are the two conditions which he fulfils in this admirable essay "Æs Triplex." The theme of the essay is the constant proximity of death and the average mortal's indifference to death, which is a sign of mental health, and the best assurance of getting something accomplished in the brief years that lie between birth and the grave. If one really dreaded death as much as our conventional language implies, he would be paralyzed for all effort. "As a matter of fact," says Stevenson, "although few things are spoken of with more fearful whisperings than this prospect of death, few have less influence on conduct under healthy circumstances."

That is a true and far-reaching remark, and concerns the idea of scaring people into righteousness. A white gentleman heard a negro preacher describe to his congregation the awful cold of hell, telling them, in that vividly illiterate style of which the negro is so often a master, how they would freeze and freeze through all eternity. When, after the sermon, the white man protested that this was contrary to the orthodox view of hell, the preacher exclaimed, "Lawd! Boss, you can't scare dem niggers by tellin' 'em hell 's hot." Fear, as a motive force, is a very temporary thing. There is a dash of recklessness in human beings which makes them "take a chance." You may see this illustrated any day where traffic is congested on Fifth Avenue, in New York. A man will pause just so long before crossing the street, but if the traffic does not presently stop, he will dart into the thick of it, "taking the chance." The peril is as great when

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he starts as when he paused, but the impatience to be about his business is stronger than deterring fear. Fear may make us hesitate, but it will not make us stop.

Stevenson cites proverbial examples of healthy people's recklessness of death—very old people, men living at the foot of a volcano, the whole human race swimming giddily through space on a planet which may at any time meet an obstruction and finish its course.

Seeing that the only thing we are absolutely sure of is that we must die, and seeing that there is always a fair possibility that we may die before the sun has run its next twenty-four-hour circuit, we might well spend our lives shivering with apprehension were there not in us something stronger than fear—the instinct to live. It is not ambition that keeps us going, but “the plain satisfaction of living, of being about [our] business in some sort or other.” “As courage and intelligence are the two qualities best worth a good man's cultivation, so it is the first part of intelligence to recognize our precarious estate in life, and the first part of courage to be not at all abashed before the fact,” to reckon “life as a thing to be dashingly used and cheerfully hazarded.”

He remembers that Dickens and Thackeray each died with an uncompleted novel in his desk, and he surmises that if it were not for this reckless scorn of death, no man would ever commence a full-length piece of work. “By all means begin your folio,” he says; “even if the doctor does not give you a year, even if he hesitates about a month, make one brave push and see what can be accomplished in a week. . . . All who have meant good work with their whole hearts, have done good work, although they died before they have had time to sign it. Every heart that has beat strong and cheerfully has left a hopeful impulse behind it in the world, and bettered the tradition of mankind.”

And then one remembers that in this, as in most things, Stevenson lived as he wrote, beginning fresh work before the sheets were dry from the blood of the last hemorrhage, and, dying, left two unfinished novels, perhaps his best—"St. Ives" and "Weir of Hermiston."

Stevenson could find no answer to Hamlet's question as to the meaning of life, nor did the question interest him. But in every day's activity he found the satisfaction of living. In his fine essay, "Old Mortality," he says: "To believe in immortality is one thing, but it is first needful to believe in life. . . . The average sermon flies the point, disporting itself in that eternity of which we know, and need to know, so little; avoiding the bright, crowded, and momentous fields of life, where destiny awaits us." This man, who for forty-four years hung over eternity by a thread slenderer and more brittle than supports most men, declined to fret himself at all about eternity. He was an optimist in many senses, including that of the Irishman who fell from a twelve-story building and as he passed the sixth story remarked, "All 's well so far."

And the lesson, if we would grasp it, is a salutary one, that if we bring our wills to bear on it we get most happiness when our possessions are smallest, being then most thrown back upon ourselves, where ultimately we must find happiness if we find it at all. It has been said that if you give an Irishman half a chance he is fine, but if you give him no chance whatever he is superb. Stevenson was Scotch by birth, but he had a superabundance of the Celtic instinct. He understood the meaning of death so well that he was resolved to understand living still better, with the result that one of the liveliest expressions of the gratification of being alive came from a man who was most of his life in a dying condition.

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There is the same paradox in his understanding of courage and its opposite. This bravest of men comprehended fear so well that his depictions of fear are among his masterpieces, as in "Dr. Jekyll and Mr. Hyde," "The Ebb Tide," "Markheim," "The Master of Ballantrae," "Treasure Island," and many others, not forgetting the nameless terror of "Some College Memories." This is the final touch in Stevenson's courage, that he could have been horribly afraid and was not, that he could have dreaded death and did not. All courage is fine, but the finest of all courage is the courage of the man who could be a coward if he would, but elects to be a hero instead.

And, by the same token, there is in all the virtue of Stevenson a quality of self-consciousness which was part of his delicately poised artistic nature. There is a virtue which is unconscious of itself, and there is a virtue which is conscious of itself, and both are virtuous. And perhaps, after all, only the virtue which is conscious of itself can express itself in art. A dog's love for its master is the symbol of self-effacing, absolute love, but the dog cannot make literature out of its love; Mrs. Browning could, and she did not love Robert Browning the less because she was able to tell him how much she loved him in the "Sonnets from the Portuguese." Like Charles Lamb, like his favorite Montaigne, Stevenson was an egotist, but, also like them, he was a beloved egotist. And he always had a liking for frank and engaging egotists, and knew how to create them in literature with skill—like Captain Burke in "The Master of Ballantrae," like St. Ives, like Alan Breck, panting with the exertion of the fight in the roundhouse, and turning to David to ask in childlike joy, "Am I no a bonny fighter?" Stevenson did not have to despise himself in order to love other men; because he was intensely interested in his own life and pur-

suits, he had a livelier interest in everybody's life and pursuits.

One of Stevenson's crowning virtues was his utter sanity, and out of that same interest in everything, including himself, there flowed a stream of human kindness, of sympathy, of comprehension of life in its true values, which has uttered itself in many volumes, and made all the world love him for his sweetness, as it has admired him for his courage. His philosophy is as notable for its sweetly modulated reasonableness as it is for its dashing courage. Only a brave man could have written "*Æs Triplex*," only a loving and lovable man could have written "*A Christmas Sermon*": "To be honest, to be kind, to earn a little and to spend a little less, to make upon the whole a family happier for his presence, to renounce when that shall be necessary and not to be embittered, to keep a few friends but those without capitulation—above all, on the same grim conditions, to keep friends with himself—here is a task for all that a man has of fortitude and delicacy."

The spirit of courage, of hope, of inexhaustible interest in life, and of frank egotism is the spirit of youth; and youth, eternal and incorrigible youth, is Stevenson's sign-manual, both in his spirit and his art. In the conclusion of "*Æs Triplex*" he says, referring to the reckless way in which brave men die: "When the Greeks made their fine saying that those whom the gods love die young, I cannot help believing that they had this sort of death in their eye. For surely, at whatever age it overtake the man, this is to die young. Death has not been suffered to take so much as one illusion from his heart." In the dedication of "*Virginibus Puerisque*" he says that he appears as "*Advocatus Juventutis*," the pleader for "life at twenty-five," the supporter of youth's arguments against the arguments of age. In the

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essay "Youth and Age" he writes that when an old man wags his head and says to a youngster, "Ah, so I thought when I was your age," it should be competent for the young man to reply, "My venerable sir, so I shall probably think when I am yours,"—meaning that one is as likely to be right as the other, one as likely to be wrong. Stevenson was forty-four when he died, and a wise man; but in his feelings he never got beyond twenty-five, perhaps never beyond fifteen. That is why he was England's greatest writer of real literature for boys. He never stopped *feeling* like a boy.

The secret of his art, like the secret of his spirit,—for I am drifting away from the spirit of the man to considerations of his art,—is this unwearied youthfulness. I am about to quote again from Mr. Chesterton, my only apology for doing so being that I was not clever enough to think of this before Mr. Chesterton had said it. Chesterton is contrasting the placid and passive state of childhood with the active, adventurous state of boyhood, and is noting that although there is an abundance of art for children, there is little true art for boys: "The finest and most peculiar work of Stevenson is rather that he was the first writer to treat seriously and poetically the æsthetic instincts of the boy. He celebrated the toy gun rather than the rattle. Around the child and his rattle there has gathered a splendid service of literature and art: Hans Andersen and Charles Kingsley and George Macdonald and Walter Crane and Kate Greenaway. . . . And then he [the boy] is suddenly dropped with a crash out of literature and can read nothing but 'Jack Valiant among the Indians.' For in the whole scene there is only one book which is at once literature, like Hans Andersen, and yet a book for boys and not for children, and its name is 'Treasure Island.' "

Stevenson quotes from a stricture by Mr. James on

"Treasure Island," in which Mr. James says, "I have been a child but I have never been on a quest for buried treasure." "Here is indeed a wilful paradox," says Stevenson by way of reply, "for if he has never been on a quest for buried treasure, it can be demonstrated that he has never been a child. There never was a child (unless Master James) but has hunted gold and been a pirate and a military commander and a bandit of the mountains." Stevenson has taken the things that boys think about and clothed them in a cultivated art, thereby giving the boy, at one and the same time, what the boy wants and what he *ought* to have—a satisfaction of his craving for adventure, and an unconscious education in literary art. Of course, he has done something which the boy never sees, ought not to see—he has related these breathless adventures with a charming, half-suppressed humor. The older reader catches the twinkle in Stevenson's eye while he is reciting these blood-curdling unrealities, but the boy takes it all in solemn earnest. It is melodrama with a smile.

Stevenson's imagination was the gift of youth, but his art was the product of almost incredible toil. And once more the pedagogue mounts the rostrum. Stevenson has written an "Apology for Idlers." College students have been known to find balm and solace in this essay, but they who have soothed their souls with this have generally neglected to read the essay called "A College Magazine" and the series of essays entitled "The Art of Writing." These contain no counsel for idleness, but rather for sustained labor such as only a brave and purposeful soul is capable of. They tell the story of how Stevenson learned to write through many years of harder toil than most day laborers could endure.

With the most painstaking toil, he studied the masters of

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style, analyzed their methods and effects, and imitated them in many volumes of manuscript. Whether work of this sort is the only way to learn to write, as he avers, is an open question; but it is not an open question that the only way to learn to write is to work. Merely to read the account of Stevenson's apprenticeship to letters is enough to make a lazy man tired. It has been said that he would write a three-volume novel, cut it down to a one-volume novel, rewrite that into a short story, and then burn the short story.

The proverb tells us that there is no royal road to learning, and assuredly there is no royal road to art. An amateur painter was showing his productions to a trained artist, prattling foolish platitudes about "little things that I dashed off in idle moments," and concluded with "I never took a painting lesson in my life." "So I see," said the artist, "but why did n't you?" Some true art has been "dashed off" in an ecstasy of inspiration, but only by men who have studied their technique through wearisome plodding years of application; the same painter who "does" a portrait at a sitting may take six weeks to do the next. The problem is to make it "come right." It may come right in a flash, or it may come right only by slow and laborious processes; but it never comes right except from the trained hand, and the trained hand, or the trained mind, is the product of long and self-sacrificing toil.

Robert Louis Stevenson wrote "Dr. Jekyll and Mr. Hyde" in three days, but "The Master of Ballantrae" was the result of years of thinking and months of writing; and both were the result of a lifetime of "learning how." So this Stevenson, with a boy's heart and essays in defense of idleness, turns out to be just one of the hardest-working men that ever acquired skill by unrelenting endeavor, turns out to be about the least consolation that a lazy man could find.

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His wife reports that the way he worked was "appalling," and the magnitude of the results "almost incredible."

Not Thomas Carlyle himself was more completely and deliberately a man of letters by profession than was Stevenson, and his essay on "The Morality of the Profession of Letters" shows how high and grave an estimate he set on the profession of his choice. The great difference between Carlyle and Stevenson was that Stevenson believed that the chief object of literature is to entertain, and Carlyle believed that its chief object is to teach. Carlyle was first the moralist and afterward the artist; Stevenson was first the artist and afterward the moralist.

Because Stevenson took this lighter view of the purpose of literature, he was content to expend his great and cultivated art on things Carlyle would have scorned, and most serious novelists would not consent to—tales of adventure, of buried treasure, of pirates, of wreckers, of beach-combers; sometimes of adventures in the forest, but more generally of adventures by sea, for the passion of the sea has gripped nobody harder than Stevenson. He responded to it in all its moods, its cruel treachery as in "The Merry Men," its vastness as in "The Master of Ballantrae," its mystery as in "Treasure Island" and a score of others, its adventures as in nearly all the books, including "Kidnapped," "The Wrecker," and "The Ebb Tide." But perhaps the chief fascination of the sea for Stevenson—aside from atavism, inherited tastes from his seafaring ancestors and his island home—was that on the sea, as nowhere else, he observed life in the terms he loved, man's struggle to live amid continual threatenings of death.

To the fastidious it seems a pity—and perhaps it is a pity—that this sensitive and highly trained artist spent so much of his energy, his character, and his delicate art on tales that hitherto had been written chiefly for the "penny

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dreadful" and the "dime library." The fact of the matter is that, to the end of his days, Stevenson was still experimenting, still practising his art, still getting ready to do the great things he had in mind, and then he died before he was ready.

There was a good deal of Scotch caution in Stevenson. With all his facility and various talents, he ventured but warily on new kinds of work. Thus he was well past forty before he attempted a full-length picture of a woman, feeling that this was too delicate a task for his art—surely an impressive instance of artistic humility. Such hesitation was just an indication of the fastidious and self-critical artist that Stevenson was by nature; he was unwilling to attempt a thing until he felt that his art was strong enough to carry it through.

Two sides of his nature express themselves in his artistic hesitation to venture on the greatest things, and in his determined active employment in the cultivation of his art. Those who are widely acquainted with academic minds know that in most of our colleges there are men who are waiting to write the great book of science, or the great book of literature, until they feel that their science, or their art, is sufficient for the task which they have proposed. Stevenson would have understood those men, for he also hesitated until he felt himself equipped; but, unlike those men, he did not wait in quiescence until time and the event should bring to him the gifts he craved; he spent the interim in the busiest exercise of his art for the sake of the art, intending to apply it to the large things later. He did not merely bide his time; instead, he wrote boys' books of adventure, and into everything he wrote poured all the best of the art he had acquired up to that time.

But if Stevenson was the true son of his active father, he

was also the true son of his mother's house—the Balfours, scholars and theologians. In "The Manse" he described with relish his maternal grandfather, the Reverend Lewis Balfour, and traced some of his own qualities back to that severe man of learning, speculating, in his whimsical way, on the possibility that there had been chance and unrecognized meetings between the Reverend Lewis Balfour and the grandfather of Thomas Stevenson, neither dreaming that their blood would mingle in a common descendant, part adventurer and part philosopher. But so it was to be, with the result that Robert Louis Stevenson wrote tales of adventure shot through with such philosophy as had not before been found in tales of adventure. Stevenson had the curiosity of a boy about foreign lands and strange seas and hidden treasure, but he had the curiosity of a man and a philosopher about that most curious of all mundane things, the workings of the human mind, and the working out of human destinies.

Whether as essayist or novelist, he had a mystic's fascination in speculating on the strange ways in which a man and his ancestors combine to promote destiny. In that same essay "The Manse," and again in the essay "Pastoral," he is seeking in his various forebears for the explanation of his own contradictory moods and whims, finding one quality in one ancestor, another in another, and so on through a long line, studying the family tree, at the top of which sits, munching nuts, the first of them all, labeled "probably arbo-real." It was a mystic, absorbingly interested in man's multiple personalities, and in his own subconscious self, who wrote those terrible stories of crime and psychics, "Markheim" and "Dr. Jekyll and Mr. Hyde."

It has been said that "The Strange Case of Dr. Jekyll and Mr. Hyde" "showed Stevenson as Poe with the addition of

a moral sense." That was the Scotch Presbyterian in him. He always referred to ethics as his "veiled mistress," and at one time drafted a book on ethics, which he never finished. With all his art, and with all his belief in the sufficiency of pleasure as the object of art, there was in him a strong feeling that art must present life in its true moral values, a view which has puzzled some of the "art for art's sake" people.

But, after all, the more serious note in Stevenson's writings grows quite as much out of scientific curiosity as out of ethics. In essays like "The Manse" and "Pastoral" he is interested in what might be called distributed personality, the derivatives from many ancestors that meet in one descendant. In stories like "Dr. Jekyll and Mr. Hyde" and "Markheim" he is interested in alternating personalities and the subconscious self. So, as I see it, the juster statement is that Stevenson stands midway between Poe and Hawthorne. In Poe the psychic interest is purely scientific; in Hawthorne it is primarily moral, with merely enough science to explain morality; while in Stevenson it is, of equal parts, scientific and moral.

So, perhaps, we have discovered one means whereby Stevenson lifts a dime-novel theme into the region of great literature—the injection of metaphysics into stories of pirates, treasure-hunters, and beach-combers. In the typical blood-and-thunder story these are merely men of desperate strength and ferocity. Moralists of Thackeray's kind might infiltrate a little goodness to point the recurrent lesson that there is some good in the worst men. Neither method is Stevenson's. He does not hesitate to make his men irretrievably bad, but he does not make them mere lay-figures of wickedness. He shows their minds working, and, of course, the moment he shows that he has humanized them. He frequently mingles with their desperate and dark deeds, not goodness, but a childlike simplicity, which renders them

human, and because human the more dreadful in their wickedness. Such is Teach the pirate in "The Master of Ballantrae," such is John Silver in "Treasure Island," and such are those desperate and lost men in "The Ebb Tide."

That was a master-stroke in "The Ebb Tide," to have Davis *praying* while on his way to commit the murder.

"Prayer—what for? God knows. But out of his inconsistent, illogical, agitated spirit a stream of supplication was poured forth, inarticulate as himself, earnest as death and judgment."

Then there breaks in on this prayer the crazy, cheerful nonsense of Huish the cockney, whose religion had never reached so deep as the Scot Davis's:

" 'Thou Gawd seest me!' I remember I had that written in my Bible. I remember the Bible, too, all about Abinadab and parties. Well, Gawd, you're going to see a rum start presently, I promise you that! "

"The captain bounded.

" 'I'll have no blasphemy!' he cried, 'no blasphemy in my boat.' "

And these two men are on their way to commit a cold-blooded murder! The very irrationality of it all makes it horribly human, as the stilted and conventional dime-novel desperado never is. This is the thinking man writing blood-and-thunder literature.

Of course, the purely esthetic element of Stevenson's novels is even stronger than the intellectual. In unity and tonal quality they have not been surpassed in the history of English fiction. His rule of unity in composition was as strict as Poe's: that each story is intended to produce a single effect, and that any sentence or word that jars on, or detracts from, that central idea must be mercilessly extracted.

When we remember the eighteenth-century English novelists, and even so skilful a literary artist as nineteenth-century

Thackeray, we realize that this conception of the *oneness* of a novel has not always prevailed in English literature. Stevenson learned this from the French, and his example has encouraged a care for technique among subsequent English writers which had been seldom observed before he wrote. He did for English romantic fiction something like that which John Keats did for English romantic poetry: he made it entirely artistic; he gave it what I venture to call tonal quality—he fitted a particular tone to a particular sort of romantic story.

The two novels which he left unfinished at the end of his life were both romantic stories of Scotland, but almost unbelievably different in their tone: "St. Ives," gay and sunny, nonchalant and high-spirited in its account of the debonair French officer's adventures in Scotland; "Weir of Hermiston," somber, gray, dour, darksome with pending fate and threatenings of dishonor's doom. Had Stevenson written only those two books, he would have demonstrated his versatility; that he wrote on them alternately, dictating to his stepdaughter now a chapter of one, and now a chapter of the other, as the mood struck him, would seem almost impossible if we did not know that it had been done.

He had an instinct that one kind of story would suit one kind of spot, and that another kind of spot called for another kind of story. In his "Gossip on Romance" he tells how certain gardens suggested to him stories of murder, certain houses ghosts, certain coasts shipwreck. He tells of a ferry which, every time he saw it, seemed to cry out for a story connected with it, and never let him rest until he had invented that story as we find it in "Kidnapped." His wife tells how "names always had a great fascination for him; . . . the flowing, mellifluous sound of 'The Master of Balantrae' he felt gave the impression of elegance and smooth duplicity." For seven years the name lurked in his imagina-

tion, until a novel to match it had been produced. All of which was exactly like John Keats, who was teased and fascinated by a phrase of Provençal French, "*La Belle Dame sans Merci*," until he simply had to write a poem to express the emotion which the words stirred in him—John Keats who cried out,

"Lo! I must tell a tale of chivalry,
For large white plumes are dancing in mine eye,"

and who after he has described the knight and his plumes has nothing more to say, for he has verbalized his vision.

In the prose writings which particularly pleased Stevenson by their euphony, he would analyze and explore a favorite passage until he found in exactly what repetition and variation of a particular vowel or consonant the charm lurked, and then he would practise these euphonies in his own style, until he had produced a result which could stand before his own critical judgment.

Whether in the atmospheric quality of the picture, or in the unbroken unity of the narrative, or in the rhythm and arrangement of the words, Stevenson was always not merely "literary" but "artistic," a distinction which he himself made, justly observing that Walter Scott, whom he admired extravagantly as "out and away the king of the romantics," was "hardly a great artist; hardly, in the manful sense, an artist at all. He pleased himself and so pleases us. Of the pleasures of his art he tasted fully; but of its toils and vigils and distresses never man knew less." In short, Robert Louis Stevenson was poet as well as romancer, novelist, and essayist. And essentially a poet he must be who will achieve the highest distinction in any of these capacities. Through many years of vigil, Stevenson had cultivated the finest graces of literary art, waiting patiently until he should feel that he could use them for the greatest literary purposes. But

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death came before the hour had struck. The best of Stevenson is only a promise of what we should have if he had lived.

And so it comes about that the art of Stevenson is a blend of *psychology and adventure*, a combination of a man's brain and a boy's heart, an appeal to the thinking man and to the active man, and all done in a literary style which was partly the gift of his fine esthetic instinct, and partly the reward of tireless industry, an art for which he paid the price that must always be paid for the best accomplishment in art—unremitting labor, unsparing pains. The heart of a boy, the mind of a philosopher, the sensibility of an artist, and the will of a purposeful man combined to make these books what they are.

There is the authority of the master—Stevenson himself—for appending a little moral to it all. He, the delicate and sensitive artist, he, the active lover of adventure, he was also the moralist, the worshiper of the "veiled mistress." The moral of Stevenson's art and work seems to be a double one: utter courage, no matter what it is we are facing, no matter what it is that is pending, and complete absorption in the thing we are doing, no matter what it is, if it is only the writing of a boys' tale of adventure. Charles Dickens said that his Golden Rule had always been never to use one hand in doing a thing to which he could apply two hands. Stevenson worked by the same rule. In a sense, Stevenson's life was incomplete; all he did was a preparation for something greater that he was going to do. He did not live to accomplish the greater things. But he did his part; he kept himself fully occupied with the work of preparation; the sequel was with the gods. If the work had to stop before it was finished, that was not his fault. If the exit was called before he had played out his rôle in life's drama, that was not his concern—nor is it ours.

STOCKTON AXSON.

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THE GEOLOGY OF TEXAS

I

ITS PART IN THE BUILDING OF A CONTINENT

IN a study of the origin and growth of the earth, whether we hold with the advocates of the Nebular Hypothesis, which has so long been the accepted theory of the development of our solar system, that the earth as we now know it cooled gradually from a gaseous state to a solid or partially solid condition, or incline to those later geologists who have presented in the place of this older theory the Planetesimal Hypothesis, which supposes that the earth has grown to its present size largely through the accretion of solid matter from planetary space, we come finally to that point where what has, in either case, been almost purely hypothetical reasoning gives place to facts of observation.

The face of the earth, with its plains and mountain ranges, its natural gorges and the many openings made by man, permits us to study a part at least of the materials which form its crust. Where we find our exposures of the earliest rock formations which appear on or near the surface of the earth, there we begin our observational geology.

While the two hypotheses may differ as to origin and previous conditions, both agree that the earliest visible rocks are the product of vulcanism and that they mark the culmination of this force as the dominant factor in rock formation and usher in the era of sedimentation. They are agreed, too, that even at the time of the early existence of these rocks as the surface material of the earth the pattern of the world

was already fashioned, the foundations of the continents were laid, and the ocean beds were hollowed out, although probably not in exactly the same relations that they hold to-day.

Changes there have been. The surface of the continents has had its numerous periods of emergence when they spread, as mountain and plain, high above the level of the sea, followed by similar periods of submergence, when they were in part buried deep beneath its waves. Likewise the ocean's depths have varied greatly, from time to time, and parts now many fathoms below the surface have had periods as land areas and teemed with the animal and vegetable life of their day. Cataclysms have marked some of these changes, but many have been so gradual that they could hardly be suspected were their records not written indelibly in the rocks.

These changes are the milestones which mark the road the geologist must travel in search of the truth concerning the origin and growth of the countless alternations of rock and sand and clay which constitute the earth as we now know it, and of the myriad forms of life which peopled this globe before our advent upon it.

The surface material of the continental area at the time when erosion and sedimentation began to be the potent factors in earth building, consisted of this series of volcanic rocks only, and the general attitude of the land area at that time must be inferred from the present exposures of these rocks and their relations to the earliest sedimentaries.

In North America, save in the region lying north of the Great Lakes, these early rocks are now largely covered by rocks of later formations; but there are areas enough in which they are exposed, or in which they are so near the surface that their presence can reasonably be inferred, to

mark out the general surface conditions of that time and give us lines along which to trace the history of the following ages.

As recognized by American geologists, the principal exposure of these basal rocks on the North American continent is found in a great V-shaped body trending northeast and northwest from the Great Lakes. This is known as the Great Northern or Canadian shield.

If the line marking the eastern border of this shield be extended southwestwardly, we find directly in its course the exposures of similar rocks at Pilot Knob, Missouri, and in the Llano region of Texas. To the westward of the latter we find again in the trans-Pecos area other exposures of the same rocks, and these are the southern extremity of the great belt of similar material of the Rocky Mountain region that stretches northwestward into Alaska, approximately paralleling the western border of the Canadian shield, thus forming a second V-shaped figure, the lines of which are closely conformable with the first.

To the east of the main body of the shield and also approximately parallel with the direction of its eastern margin, a series of outcrops of similar rocks, known as the Appalachian belt, extend from Newfoundland to Alabama.

On the Pacific Coast we find still another belt of these exposures which, beginning in southern California and Arizona, trend southwestward along the western margin of the Sierra Madre through Mexico, in effect marking the southwestern border of the continent as the Appalachian marks its eastern limits.

If we project the axial line of the Appalachian belt southwestward it will meet the Pacific belt south of Manzanillo, and such an extension would form a third V, the lines of which would approximately parallel the other two.

These lines of outcroppings of our earliest rocks, trending northeast on the Atlantic side and northwest on the Pacific side, form what Dana calls the protaxes of the continent.

In the depressions occupying some part of the space between these several protaxes were gathered the waters of the first epi-continental seas, and the detritus arising from the erosion of the land areas was carried down and deposited in them as well as in the oceans that washed the shores of their outer slopes.

Thus these protaxes give the dominant structural lines along which development proceeded, and those portions we see to-day are only the vastly attenuated remnants of the great land areas which existed in the beginning of the geologic record, since it was from their mass that the greater portion of the material was derived which filled the intervening troughs with thousands upon thousands of feet of sedimentary sands and clays.

That area which is of especial interest to us at this time is located at the southern extremity of those ancient elevations which formed the second or central V. We had in this region, in the beginning of sedimentary deposition, a broad belt of crystalline rocks extending from the Colorado to the Rio Grande, reaching southward an unknown distance into the waters of the ocean, and enclosing within its arms northeast and northwest an area to be later occupied by a long succession of continental seas.

This belt of crystalline rocks formed a barrier, therefore, more or less complete, between the waters of the interior sea and those of the open ocean, a barrier which afterward at different times was broken through or even entirely submerged. Consequently, the connection of the present exposures of the central and west Texas areas with each other is now deeply buried beneath the accumulated sediments of

later formations, as is also such connection as may have existed with Pilot Knob and the Nucleal V to the northeast and in some measure with the Rocky Mountains to the northwest, yet the overlying beds give evidence that such connection did exist and that the lines as here drawn have been and are the dominant ones for this particular region.

This ancient belt of crystalline rocks is known to us now only by remnantal patches. At the eastern extremity we have the Llano granites, gneisses, and schists exposed over an area some sixty miles in length by forty miles or more in width.

Going westward for three hundred miles, we find only the limestones of the Cretaceous mantling all else until we reach the trans-Pecos country. In this region the Rocky Mountain protaxes are now represented by four separate lines or belts of mountainous elevations separated by broad valleys filled with comparatively recent deposits. In each of these belts we find areas of exposures of pre-Cambrian rocks similar to those of the Llano region, and these exposures, beginning on the Colorado and ending on the Rio Grande, all occur along a line approximately N. 75° W., which is that determined by Comstock as being the primary and fundamental structural trend of his Burnetan (or the basal granites and gneisses) of the Llano area, and which is also approximately the direction of the main structural axis of the Wichita and Arbuckle mountain masses, of similar age, lying to the northward of our area.

The Llano rocks include gneisses, schists, and granites with bands of crystalline limestone, quartz porphyry, serpentine, etc.

In the Apache mountains the pre-Cambrian rocks comprise granites, schists, and crystalline limestones.

The Diabolo-Van Horn region shows below the Cam-

brian sandstones, schists, quartzites, conglomerates, crystalline limestones, granites, and igneous intrusions.

In the Franklin mountains, however, the basal rock of the pre-Cambrian is a great deposit of quartzite which is overlain by rhyolitic conglomerate and rhyolite porphyry, such granite as occurs being considered to be of much later age.

In addition to these exposures, crystalline rocks also appear at points between them, and although their exact relations have not been fully determined, it is highly probable that they will similarly be found to be parts of the original belt.

It was Comstock's belief that some of the older rocks of the Llano region were in reality a part of the original Archean land mass, and, from my own observations, both in Llano and in west Texas, I am inclined to agree with him, and believe that when the matter is fully worked out it will be found that such masses can be differentiated in both areas. Later investigators, however, have given a different interpretation to the conditions found, and claim that the rocks are probably not older than the Eparchean or Algonkian. However this may be, even if the very earliest rocks are no longer uncovered, we have in these exposures in central and western Texas, masses of the earliest known sedimentaries, which were certainly derived in large part from such Archean land mass, and were subjected to vulcanism, intruded by eruptive material, metamorphosed into gneiss, schists, and marble, and strongly folded and eroded prior to the beginning of the deposition of any of those beds containing definite traces of fossil remains which now mark the earliest stage in historical geology.

Thus began the building of this portion of the continent,

and with the emergence of these areas and the ushering in of the long time of sedimentary deposits which followed, vulcanism seems to have died out almost entirely, and we find no traces of eruptive materials in any of the overlying beds until after the Carboniferous.

At the beginning of the Paleozoic we had as land surfaces the areas mentioned, which were undoubtedly of much greater extent than at present. No sediments of earlier Paleozoic time are known in this region, the lowest deposits of the west being the Bliss sandstone, which is referred to the middle or upper Cambrian, and the Hickory sandstone in the east, which is clearly of upper Cambrian age. It is therefore apparent that through earlier Paleozoic time our area continued above the sea, and in the Llano region we find that the surface was worn comparatively smooth in many places prior to its submergence.

The waters transgressed from the westward and first engulfed the El Paso region in middle Cambrian times, but did not reach the Llano lands until the upper Cambrian.

In the west the Bliss sandstone, which has a thickness of 300 feet, is the only Cambrian deposit so far positively recognized, although Richardson suggests the possible upper Cambrian age of the lower portion of the El Paso limestone. The Bliss sandstone occurs in the Franklin, Hueco, and Diabolo mountains, but it is not always present between the pre-Cambrian rocks and the overlying Ordovician, which in places is found resting directly upon the pre-Cambrian.

In the Llano region the first deposits in the encroaching sea were the sandstones of the Hickory series. As the water deepened these were followed by greensands, shales, and shaly limestones, succeeded by a more massive limestone with chert. This sedimentation apparently continued with-

out serious interruption; and although the base is upper Cambrian and the top as shown by its fossils is lower Ordovician, no hard and fast line can be drawn between the two.

This massive limestone marks the close of deposition in this area at this time.

The total thickness of the rocks in the Llano region now recognized as belonging to the Cambrian and Ordovician is about 1600 feet. They are found entirely surrounding the old granitic core, and their relations to it clearly indicate that at the time of their deposition this area was an island in the Cambro-Ordovician sea. Furthermore, nowhere in this area have there been found any deposits of an age intermediate between this Ordovician limestone and the overlying limestone which contains fossils of the Pennsylvanian series of the Carboniferous; from which fact we infer the recession of the sea immediately following the deposition of the Ordovician, leaving this entire area dry land.

In the west the conditions were different. In the Franklin mountains we find resting upon the Bliss sandstone not only a limestone having a thickness of 1000 feet or more with lower Ordovician fossils, but overlying this another limestone 400 feet in thickness with fossils of middle and upper Ordovician age, and following this again, without any apparent unconformity or sensible break in deposition, 1000 feet of other limestones with Silurian fossils, proving that the western end of the belt continued under water until at or near the close of the Silurian.

Similarly in the Diabolo region the lower Ordovician is followed by limestones carrying fossils of upper Ordovician age.

The Ordovician which occurs in the Caballos mountains near Marathon contains fossils of the Trenton stage, and is possibly followed in that locality also by Silurian beds as in

the Franklin and Diabolo mountains, although, up to the present, distinctive fossils from the deposits supposed to be of this age have not been brought to light.

With the close of the Silurian the waters receded from this portion of Texas also.

As next recorded, our history begins with the Pennsylvanian deposition. Of the happenings in and around the Llano region through that long interval of time in which was laid down, in other areas, the vast thickness of sediments now referred to the middle and upper Ordovician, the entire Silurian and Devonian systems and the Mississippian series of the Carboniferous, we have now no trace and must conclude that during this period the Llano region was a land area or that such sediments as may have been laid down had been eroded prior to the beginning of the Pennsylvanian.

So also to the west, since we have no records between the Silurian and the Pennsylvanian, we infer a land area during that period, or such uplifts and erosion of the area as removed the few sediments that may have been laid down.

No visible evidence in the way of outcrops exists at this time to show the exact condition of the region lying between these two known land areas, but it is more than probable that it was also land and that as such it continued to be a barrier separating the waters of Gulf and Ocean of the south from those of the central seas to the north, not only during the long interval of time as shown by the recording sediments already mentioned, but through the entire Paleozoic and much of the Mesozoic as well.

This is indicated by the fact that the formations occurring to the north of this belt, which are earlier than the Cretaceous, are all directly connected with or entirely similar to those of the interior seas, while directly south of this

belt no such formations are known to occur, and such as do occur in its western extension or which have been found by drilling along its southern border show that they were laid down in the open waters of the Gulf or Ocean.

Therefore, for a period of time covering much more than one-half the great span occupied in building the earth from the beginning of sedimentation to its present condition, the belt of territory which we have been considering was itself a land area.

This area, which took its form in the very beginning of known geologic time, which gave of its materials to build the territory surrounding it, and which has from the beginning until now exercised so great an influence upon the character of the sediments and the shaping of this portion of the continent, should, it seems to me, be now clearly recognized despite the fact that it is at present visible in exposures of its own materials only at its eastern and western extremities.

With the incursion of the Pennsylvanian sea, deposition again became active over a large portion of the State.

The earliest deposits noted are those now exposed on the eastern margin of the Llano region, consisting of limestones and shales. On the southeastern margin of this region, in Burnet county, both the limestone and its overlying shale are found. Along the southern margin, in Gillespie county, at the falls of the Pedernales, and in Spring creek, the only exposures observed are those of the limestone. To the northeast exposures of these limestones and shales are found from Lampasas westward to the Colorado river and following the valleys of the San Saba and Richland creek to or beyond the mouth of Brady creek.

These beds, except where disturbed by faulting, dip away from the old Llano headland on all sides. From the vicinity of Bend on the Colorado river, where these beds were

first described, there appears to be a geanticlinal fold in these rocks running northeastward through Lampasas county, which was developed prior to the beginning of the overlying Coal Measures, and this fold shut out the Gulf waters from the interior region.

East of this fold these limestones and shales are succeeded directly by the Cretaceous; west of it, by the Coal Measures of the Upper Pennsylvanian and by the Permian deposits.

The succeeding sediments of this portion of the State are entirely unconformable with those of the Bend, and were deposited in an interior sea which stretched northward into Oklahoma and Indian Territory. They comprise the sands, clays, limestones, and coal of the later Coal Measures, and the sands, clays, limestones, and gypsum beds of the Permian which overlie them.

The southern margin of the sea is clearly shown along the northern border of our ancient land mass in San Saba county, and many of its bays and headlands are clearly distinguishable to-day. Its eastern margin was probably a land mass lying east of the Lampasas geanticlinal. The land areas of the Arbuckle-Wichita mountains formed its northwestern shore, and there was probably another land mass in the west having somewhat the position of the present Llano Estacado.

The northern and southern shore lines are clearly shown by the character and dip of the deposits adjacent to them, but the others can only be inferred at this time.

We know from the variable character of the deposits along the eastern part of the area that this side of the sea was subject to changes of level due to the influx of water or the elevation or depression of the earth's surface, which gave variously open sea conditions when limestones were

laid down, alternating with shallower water in which were deposited sands and clays derived from the adjoining land, and with swamp conditions which permitted the formation of coal.

Toward the close of Pennsylvanian time this sea gradually shallowed and brought in the period of the Permian red clays and sands and meager limestones. And these, as the sea gradually dried up, gave place to the great gypsum deposits which marked the desiccation of this sea and the close of the Carboniferous epoch.

The conditions in the trans-Pecos region during the Carboniferous and Permian were markedly different. During its long emergence the old land mass had apparently been worn down to a nearly even surface; and as the waters of the Pennsylvanian sea, which came in from the west and south, covered it, there was first laid down a conglomerate of the regulus of the materials directly underlying, whether they belonged to the granites, schists, etc., of the pre-Cambrian or to the sandstones or limestones of the older Paleozoic; and this was immediately followed by limestones which are clearly of marine origin, and no deposits occur which could have been brought in from adjacent land areas. These limestones have a thickness of more than 3000 feet, thus indicating the long continuance of comparatively stable conditions suitable for their deposition. They are known as the Hueco limestone.

Large areas of these limestones are now exposed in the various mountain masses and ranges of the trans-Pecos area, and they can be seen in buttes and mesas along the railway lines.

So far as known, the Hueco limestones have not been observed east of the Diabolo mountains, and it is possible that they were limited on the east by the supposed land mass

which formed the western border of the interior Carboniferous sea.

On their eastern border these Hueco limestones were followed by others which are referred to the Permian, but exact contacts have not yet been found.

In the Guadalupe mountains the Permian deposits comprise the Delaware mountain beds, which toward the north are prevaillingly sandy with thin limestone bands, but southward in the main mass of the mountains consist almost entirely of limestone with only minor strata of sand. These have a thickness of 2200 feet and are overlain by 1800 feet of El Capitan limestone. These limestones carry an abundant and characteristic marine fauna entirely different from any yet found in the interior. So far the only other occurrence of such fossils known is in the Presidio region, more than 100 miles to the south of the Guadalupes. It is therefore apparent that during the early Permian in this western area the sea was still open to the south, and that on the north and east there existed a land barrier.

Following the deposition of these limestones, but still within Permian time, the Guadalupe and Delaware mountain masses emerged from beneath the sea and became a land area. The barrier which had existed to the east was eroded or submerged and the interior sea extended to the base of the Guadalupes, so that the continuations of the upper beds of the Permian of the interior area with their gypsum deposits were laid down here also, and thus the interlapping of these different types of deposits of the east and west is found in the valley of the Pecos river.

This marks the close of the Paleozoic era, and the earth movements of that time brought the largest portion of the State as we now know it above the waters of the sea, and it is probable that parts of it have never again been engulfed.

So far as we can judge from conditions now known, the Mesozoic began with Texas as a land area and so continued through the Triassic, Jurassic, and earliest Cretaceous.

During some portion of the Triassic a large fresh-water lake occupied the area of the present Llano Estacado and extended northward for some distance. In its sediments we find vertebrate remains through which its age is definitely established, and in addition vast quantities of true *Unios* are found, this being the first appearance of these fresh-water bivalves upon the globe so far as now recorded.

In the Malone mountains southeast of El Paso there are some limestone beds which show that the oceanic or gulf waters covered an area of unknown extent in that vicinity in Jurassic time.

The character of the deposits and the fossils contained in them indicate that they were laid down near shore, and it is probable that the original area was not large. So far as we have yet found, this is the only exposure of deposits of Jurassic age in Texas. Their presence, however, in the connection in which we find them indicates the beginning of the great submergence which reached its culmination during the succeeding Cretaceous era, and by which practically the entire Texan land area was covered by the waters of the Southern ocean.

During the early Mesozoic deposition was very active in central Mexico and seems to have been practically continuous through the Triassic, Jurassic, and lower Cretaceous. The study of the rich fauna which has been collected by the Geological Survey of Mexico shows transition beds between the Jurassic and the Cretaceous followed by the entire lower Cretaceous column.

Coming in from the south, the sea first reached our borders in the region of Presidio del Norte, and here were de-

posited the gravel and sand which constitute the lowest beds of this age of which we have knowledge in the southwest, but which the Mexican geologists claim are somewhat higher in the section than the lowest Cretaceous beds existing there, showing that some interval of time was required after the commencement of the Cretaceous deposition for the advancing sea to reach our territory.

The lowest division of the Texas Cretaceous is known as the Trinity. In its fullest development it consists of three members called in their ascending order Trinity sand, Glen Rose limestone, and Paluxy sand. When the members are all present they indicate a gradual deepening of the sea in that locality until the end of the Glen Rose followed by shallower waters in the Paluxy. There are, however, many places where only sands are found, and it is sometimes difficult to know whether these are Trinity or Paluxy. Where fossils occur in them there is less trouble, since those of the Trinity are oysters or other marine forms, while the Paluxy is usually characterized by plants and fossil wood.

West of the Guadalupe mountains the advance of the waters was very slow, and during the entire Trinity deposition they did not reach northward beyond our old barrier. The sands of the ridges just north of Sierra Blanca are the most northerly outcrops we can now refer to this age.

To the east of the Guadalupe, however, a different story is told. The Trinity ocean spread more rapidly east and north, and, engulfing the old barrier between the Guadalupe and the Llano region, reached northward over the Staked Plain and into Colorado and eastward into Arkansas.

North of Kent there are extensive deposits of Cretaceous sands which from the large amount of fossil wood we consider Paluxy. The sands may be the worked over sands of the upper Permian beds and the trees may have come from

the wooded slopes of the Guadalupe mountain area. The Trinity is also found along the scarp of the Staked Plain and in the detached buttes and mesas lying north and east of it, but the sands thin rapidly toward the north.

The Llano mountains alone remained as islands in this Trinity sea, which entirely surrounded them. This is proved by the fact that in many places later beds of the Cretaceous are found resting upon the rocks of this region, the sands being entirely absent.

The beds of sand so deposited were destined to be of incalculable value to us, since they are now the source of the artesian water of north and central Texas and furnish the supply that through the series of great springs or natural artesian wells yields such abundant flows from Del Rio to Georgetown and is the source of the San Marcos, Comal, Guadalupe, and San Antonio rivers.

In the gradually deepening waters which followed were laid down the limestones of the Comanche Peak and Edwards subdivision of the Fredericksburg over an area even wider than that of the Trinity. Throughout this area the Edwards limestone, by reason of its ability to resist erosion, forms the surface rock over perhaps as large a territory as any other single formation in the State.

West of the Guadalupes, as before, the Fredericksburg sea beat almost in vain against the south shore of our barrier land, and all deposits now known are of comparatively deep-sea character and with few exceptions lie south of the railroad line.

East of the Guadalupes the waters were able to reach into the interior, and, as with the Trinity, we find the Edwards limestone in the scarp of the Plain, and to its hardness and protective covering are due the outlying buttes and mesas to the north and east.

It is found surrounding the Llano region on all sides and is thought by some to have covered that area as well. It is true that its present relations to the older rocks give considerable weight to this idea; but, when we consider at the same time that there are granite peaks along the southern border of the region which are surrounded by the limestone in such manner as to indicate that they at least were never covered, it would seem probable that not even in Fredericksburg time was the Llano region entirely submerged.

The Washita deposits which followed the Fredericksburg, and which are in part very similar to them, are for the most part more marly in character and carry a variable amount of clayey material in connection with the limestones. This variable character of its deposits in different localities marks like variations in the conditions there existing during the time in which they were laid down. South of Sierra Blanca no appreciable break was found between the Fredericksburg and the Washita, and certain fossil forms such as the *Caprina* which are characteristic of the Fredericksburg in central Texas continued up into the Fort Worth limestone in this region and are also found as far east as the Devil's river, indicating that the deeper sea continued here through both Fredericksburg and Washita, while the deposits which extend up the Pecos trough correspond in a general way with the shallower water deposits of central and north Texas.

Similar conditions to those which existed in our trans-Pecos region during Fredericksburg and Washita times extended westward as far as Bisbee, Arizona, where we find similar beds and the same fossils.

Overlying the Fort Worth limestone there is a bed of clay with thin limestone partings which, while only 75 feet in thickness, forms a belt which extends with only slight intermissions from Red river to the Rio Grande. It is called

the Arietina or Del Rio clay. It is followed by a bed of limestone of even less thickness in most exposures, which is characterized by its peculiar mottling and its fossils and is known as the Vola or Buda limestone. The Arietina throughout this area shows by its materials the shallow sea and near shore conditions, the overlying limestone a recurrence of deeper waters immediately preceding the emergence which marked the close of lower Cretaceous sedimentation of which the Vola is the latest member.

The fact that the lower Cretaceous did not submerge our barrier west of the Guadalupe is well attested by the exposures that exist. Beginning on the Rio Grande south of the Malone mountains, we have the small exposure of the Jurassic capped by the Trinity and Fredericksburg. A few miles to the northward the Fredericksburg rests directly upon the Pennsylvanian limestones, and still beyond the Washita rests upon the same limestones without the presence of either Trinity or Fredericksburg, proving the very gradual encroachment of the sea upon the land. This last contact occurs southeast of El Paso, and north of it there is nothing to warrant the belief of a further extension of the lower Cretaceous in that direction. Similar conditions exist south of the Diabolos and in southern Arizona.

With the beginning of upper Cretaceous time the sea became shallower along the coastal plain and in the western portion of our Texan area, and it was practically shut out from the great interior region of the continent during the period in which the non-marine Dakota sands were being deposited there. Similar sands, apparently the equivalent of these in time, but of marine origin, are found outcropping in the northeastern portion of the State, but they thin out and finally disappear before reaching the Brazos river. They have been called the Lower Cross Timber or Wood-

bine sands. These sands are not found again until we reach the extreme western portion of the State, and there the exposures are limited.

Over the greater part of our area the formation found in contact with the Vola or Buda limestone, the upper bed of the lower Cretaceous, is that of the clays and shales known as the Eagle Ford or Benton and which also overlies the Woodbine or Dakota when this is present.

During the interim between the deposition of the Buda limestone and the Eagle Ford shale the former must have stood very near the surface of the water, since even where long contacts are observable the two formations appear to be entirely conformable and there is little or no evidence of erosion in the limestone prior to the laying down of the shale.

The Benton shale marks the beginning of marine sedimentation of vast geographical extent, reaching from Canada southward into Mexico. There are at present, however, no remnants of this sedimentation within the central basin region of Texas, and if at any time either this shale or succeeding beds of the Cretaceous mantled this area, they have been completely eroded and no trace left behind. In my opinion, the indications are that after the emergence at the end of the lower Cretaceous the waters of the sea or ocean never again invaded this area, but that the connection of the marine waters of the Mexican region with those of the Interior Basin lay elsewhere.

The relation of the Woodbine sands to the Eagle Ford shale is such as to suggest that the former are simply the early shore deposits of the period and possibly contemporaneous with the basal portion of the shales lying to the south, which, with the deepening of the water northward, gradually covered them also.

These shales, therefore, are found as a fringe around the coastal slope and extending westward nearly to El Paso. Beginning at Red river, we have a thickness of 600 feet of clays, largely bituminous but with some lime, especially toward the top. Going southwestward toward the Colorado, they gradually thin out, the more limy portion only persisting so that at Austin the entire thickness is only some 50 feet. To the south and west, however, they again gradually increase in thickness, retaining their more limy character, and in the neighborhood of the Rio Grande in El Paso county are at least 1000 feet in thickness. Still greater thicknesses are reported in the Mexican area.

The Austin chalk, which followed, marked a change in marine conditions over the greater portion of our coastal plain. Only in the northeastern border and in the region west of the Chisos mountains in the trans-Pecos did the conditions remain as they had been, so that the deposits in these localities are similar to the Eagle Ford in character, although they carry the fauna of the chalk. For hundreds of miles between these localities, on the other hand, the white or creamy chalk abruptly replaces the clays and limy shales, indicating a deeper sea and one comparatively free from sediments derived from land areas.

The hundreds of feet of this formation are made up of chalk and chalky marls, but toward the end of the period more and more terrigenous sediments were incorporated with these, and they gradually pass upward into the Taylor marls, there becoming simply limy clays with some sand, and finally into the more sandy beds of the Navarro and Escondido which form the top of our upper Cretaceous series.

Thus the upper Cretaceous series as a whole indicates that

along our coast the sea gradually deepened and then as gradually shallowed toward the close. The total thickness of these beds in eastern Texas is estimated at 3500 feet. On the Colorado it is only 1500 feet, while toward the Rio Grande and in trans-Pecos Texas it again thickens to several thousand feet.

These deposits, extensive as they are, are really very small beside those which were laid down during the same period in the great interior region. Nor do they compare in thickness with those laid down as their southern extension in Mexico. Akin to each, they yet differ in many respects and especially in the variety of their fossil contents.

During the upper Cretaceous igneous forces again became active and in the vicinity of Austin one or more volcanoes broke forth and the ash from them is found interbedded with the upper portion of the Chalk and the lower portion of the Taylor marls. The old necks or plugs of basalt of these volcanoes are still to be seen southwest of Austin.

Many other bodies of basalt, which are probably of this same age, are found coming up through the beds of Cretaceous materials at various points between the Colorado and the Rio Grande.

The indications are that these igneous forces were still more active in the trans-Pecos country, and that the action was of longer continuance, either stretching well into the Tertiary or recurring during Tertiary time.

With the close of the Cretaceous period the recession of the sea brought to light a still broader area of our coastal plain and added it to the continental land, and over the greater portion of the State as it existed at the close of the Cretaceous land conditions have apparently continued almost without interruption until the present time.

In the northwest deposits of later Tertiary age occur in old lake or river basins, and similar deposits occur in connection with drainage channels in other portions of the State. In the trans-Pecos beds of clays and sands occur interbedded with volcanic materials which are probably of Tertiary age. Otherwise these Cretaceous deposits were not again inundated by marine waters until the Lafayette invasion of the late Pliocene, and this evidently covered them only in part.

That portion of our present area which we owe to Tertiary deposition forms a broad belt between the old Cretaceous land and the present Gulf shore. In it we find our greatest deposits of iron ores and lignites, of gas and oil, sulphur and salt.

A study of these Tertiary beds indicates that they were laid down, under conditions somewhat similar to those existing to-day along our coast, either in the waters of the Gulf itself or in the bays and lagoons which fringe it. We also find that while deposition was apparently regular during lower and middle Eocene time, it was either interrupted and irregular during the later Eocene, Oligocene, and lower Miocene, or that, if sediments were laid down during these periods, they were subsequently eroded, since, with some small exception, we find no evidence of them in this area now.

The Eocene as we know it is a continuation of beds of similar age in Louisiana and States lying to the eastward, and these continue southward beyond our boundaries into Mexico, finding their final outcrop in that region in the eastern borders of the Tamaulipas range which reaches the Gulf coast below Sota la Marina. South of that point they are not known in Mexico, although they, or beds with similar fossils, occur in Central and South America.

The basal deposits of our Eocene comprise clays carrying concretions of a bluish-gray limestone which weathers brown.

It is not always visible, however, for the overlying beds frequently overlap and conceal it.

The Lignitic beds which form the second stage of the Eocene are continuous from the Sabine to the Rio Grande, although on the latter stream they have largely lost their lignite-bearing character. These lignites, with the accompanying thinly bedded sands and clays, were slowly deposited in the quiet waters of coastal lagoons, and the lignite beds, while attaining a thickness of many feet in places, are usually of lenticular shape, although they may underlie a very considerable area.

These beds are best developed in the eastern portion of the State, extending southwestward to the Brazos river. They have a thickness of 1200 feet.

With the close of the Lignitic the lagunal conditions gave place to marine, and the succeeding stage was ushered in by the deposition of a belt of sands which, while of no great thickness in the eastern part of the State, increase in importance toward the Rio Grande, where they assume great prominence in the formation. These are called the Carrizo sands, and at times they cover all the older Tertiary beds and some of the Cretaceous as well. Just south of the Rio Grande they make up the body of a considerable range of hills.

These sands are succeeded by sands and clays with green-sand which carry many molluscan fossils and constitute a very important member of the Eocene, extending entirely across the State. These are known as the Marine beds and have a thickness of 1000 feet or more. In northeastern Texas they carry also vast quantities of limonite iron ores.

Toward the close of this substage lagunal conditions again prevailed, and the Yegua clays with their accompanying lignites were laid down. This series of beds, with a thickness

of 600 to 1200 feet, is preëminently the gas belt of the coastal country. All of the large wells so far struck in that region derive their supply from it.

The Yegua was succeeded by another series of sands and clays, the sands greatly predominating, which we know as the Fayette sands. Where these sands are indurated, as they frequently are, they form ridges and hills and are the deciding factor in the topography of the area.

They were succeeded by another belt of clays and clayey sands which we call the Frio clays, and with these the deposition of the Middle Eocene was closed and the withdrawal of the sea left the entire Eocene a dry land area.

A careful study of this area has yielded no evidence, except in the eastern portion of the State, of any other beds having been laid down in it prior to those of the upper Miocene.

Between the Sabine and Neches rivers, however, erosion completely removed the Frio clays and all of the Fayette except a few remnants near Lufkin, and on the beds of the underlying Yegua thus exposed were laid down the clays and impure limestones of the Jackson or upper Eocene. These beds have been traced from the Sabine to a point some 20 miles west of Corrigan, where they feather out and disappear entirely and the Fayette comes in again in its proper position.

With the Jackson all deposition along our coast seems to have ceased for a long period. To the east in Louisiana and to the south in Mexico deposits of Oligocene age occur, those of Mexico being very extensive, but none of these are found in Texas, at least upon the surface. Similarly, all deposits of lower Miocene seem lacking.

Our next records date from the middle or upper Miocene.

In the northeastern portion of the State, over what is now

known as the Staked Plain, a lake condition developed which continued in some shape through the Pliocene and into the Pleistocene. The different stages are well marked by characteristic vertebrate remains. The exact extent of this lake and its fluvial accompaniments cannot now be told, but at one time it evidently reached as far south as the lower edge of the Plain, and a portion of its eastern shore line is well preserved in the detached butte on the southern edge of Garza county.

Similarly, the Oakville beds which we find succeeding the coastal Tertiary deposits already described carry a vertebrate fauna of middle or upper Miocene age. On the Nueces river, where these beds have been most studied, the Oakville and overlying Lapara of the Pliocene are evidently deposits laid down in rapid currents of shallow water and consist principally of sands and sandy clays. These are succeeded by the Lagarto clays, which are highly calcareous, and these by the Reynosa phase of the Lafayette formation.

In this immediate vicinity the Oakville rests upon the Frio clays, as it also does on the Rio Grande; but in many places, either from the erosion of the clays or the transgression of the Oakville beds, these sands rest directly upon the Fayette, and so close is the resemblance of the materials of the Fayette and Oakville that in such case it is sometimes difficult to separate them.

East of the Colorado the Oakville is somewhat more conglomeritic in places and carries worn fragments of an upper Cretaceous gryphæa. It contains many fragmental remains of vertebrates and some beds of leaves.

In eastern Texas the Oakville is overlain by the Fleming clays, which are supposed to be the continuation, or at least the time equivalent, of the Lagarto, which they greatly resemble in character. These clays carry an extensive inver-

tebrate fauna of brackish water forms, the age of which is placed as early Pliocene. These fossils, found in connection with the outcropping of the beds 80 to 100 miles from the coast, are also found at a depth of 3000 feet in a well drilled near Terry, fifty miles south of their southern boundary.

Within the area occupied by the Fleming clays vertebrate remains have been found which belong to the upper Miocene. The difference of age as indicated by the vertebrate and invertebrate forms requires further investigation.

Up to this time no surface exposures of Miocene deposits of marine origin have been discovered in Texas, but they have been found in wells drilled at Galveston and Saratoga, and doubtless occur at other localities.

The Fleming clays are overlain by the Orange Sand phase of the Lafayette, which marks the close of Tertiary deposition.

Between the outcrop of these Lafayette beds and the Gulf coast there is a belt some fifty miles in width occupied by the Coast clays, which forms the latest contribution of the receding waters to our growing land.

These clays now form a comparatively level plain with a very gentle coastward slope. From data accumulating through a closer study of the region, and through the logs of wells drilled in the search for oil and water, we are gradually acquiring a knowledge of the conditions of the old Tertiary land surface on which these clays were laid down; and it now appears that this must have had a somewhat rugged topography, since, while these clays have a thickness of hundreds and even thousands of feet, in a few instances they fail to cover the tops of old Tertiary hills which to-day protrude through them. Others which are covered have been found

by drilling. It is in connection with such hills that many of the deposits of oil, salt, and sulphur have been found.

Thus, beginning with the granite core of the Llano-El Paso belt—the old Llanoria land of the paleogeographers—connection was gradually made during Paleozoic time with other land areas to the north and northwest. During the Eozoic the growth was southward and eastward in the waters of the Gulf or Ocean, which, upon the whole, now shows a recession of nearly two hundred miles from the early Cretaceous shore-line.

The entire area, since its emergence from the waters, has been subject to orogenic movements and to agencies of erosion, and these have sculptured the face of our land into the form in which we find it to-day.

II

INDIVIDUALITY

WE have reviewed briefly the manner in which the Texan area became a part of the continent by growth through workings of natural forces of sea and land. These, while operating in somewhat different ways to the north, the west, and the south, builded steadily to the completion and unifying of the whole.

This region, therefore, is, as we have seen, the meeting-place of three distinct provinces of geologic growth; and while there is a general uniformity in the deposits of the eastern and southern portions of the State with the coastal deposits of the other Gulf States, a similar uniformity of those of the northern portion with the great Central Basin region, and of the western portion with those of Mexico, New Mexico, and Arizona, there are also differences which, in their way, are as marked as the resemblances. These individualities are found not only in the character and extent of the deposits themselves, or the entire absence of deposits of certain periods, but also to a somewhat less extent in their present conditions as related to our use of them.

The pre-Cambrian rocks of the Diabolo region include a belt of limestones containing chert, and are more or less metamorphosed, some of them being marbles of pleasing color and texture. From their general character and stratigraphic position we have regarded them as the possible equivalents of the similar group of magnesian limestones in the Llano region called by Comstock the Texan marbles.

These limestones, which, in the Diabolos, seem to have a thickness of 500 feet, underlie a brown sandstone 150 feet in

thickness, above which we find red eruptives—porphyry, basalt, and lava—200 feet thick. Pebbles and boulders of the eruptives, brown sandstone, and limestones are found in the basal conglomerate of the Cambrian of this region, showing that these rocks are all pre-Cambrian.

This brown sandstone and the overlying eruptives, therefore, bear a relation to the Cambrian deposits of the Diabolo mountains similar to that the Llanoria quartzite and overlying rhyolite porphyry of the Franklin mountains bear to the Cambrian of that area. There is the difference, however, that at some points in the Diabolos there seem to be evidences of other beds having existed between the eruptives and the conglomerate.

Underlying these limestones there appears in many places a massive body of even-grained red material called by Streeruwitz the Diabolo sandstone. It is also found in similar relation to the Texan marbles west of this locality in the valley between Eagle Flat Mountain and the scarp of the Diabolo mountains to the north, and in various exposures where the Texan marbles are absent, from erosion or non-deposition, the Cambrian, Silurian, or Pennsylvanian rocks are found in contact with it. This material forms the country rock of the Hazel mine, and exposures of it in the hills north of the mine show a thickness of 500 feet, and the base is not visible.

As we have seen, the earliest evidence of the Cambrian sea in Texas is found in the Franklin mountains near El Paso, and its waters did not reach the Llano region until a somewhat later period.

If we compare the early history of the Llano region with that of the Arbuckle and Wichita mountains, which, although some three hundred miles north, are the nearest points outside the State where the earlier formations occur

as surface rocks, we find a close similarity in the initial sediments of the two areas. The basal series of the Llano region, beginning with the Hickory sandstone and followed by greensands, shales, and shaly limestones, finds its duplicate and probable continuation in the Reagan sandstone of the Arbuckles, not only in the character of the materials, but in fossil contents.

The broad extent of the Cambrian sea, which embraced the trans-Pecos, Llano, and Arbuckle regions, is shown by Ulrich, who states: "Very similar, apparently contemporaneous, deposits and faunas are found also in New Mexico, Arizona, and the Bighorn mountains of Wyoming."

The beds of shaly and massive limestone or dolomite with chert of the Llano region which follow this Cambrian sandstone and show continuous sedimentation through the uppermost Cambrian and into the lower Ordovician, are also found in the Arbuckles, overlying the Reagan sandstones as the Arbuckle limestone. Here, however, the maximum thickness of 1000 feet, which the beds attain in the Llano region, is greatly increased, reaching 4000 and even 6000 feet.

At this point deposition in both areas seems to have ceased for a time, and with the emergence of this limestone as a land area the history of the two regions ceases to be the same.

In the Arbuckles, after a brief period of erosion, the land was again submerged, and deposition continued more or less regularly through the Ordovician, Silurian, and Devonian into the Mississippian, and during this time some 3500 feet of sediments were laid down, no representatives of which are now known in the Llano region. Just how far southward the seas in which these materials were deposited in the Arbuckle region may have extended, cannot now be even surmised, but apparently they did not reach the Llano region,

which stood through all these ages as the barrier between these waters and those of the southern ocean. Or if any portion of the overlying rocks of the Arbuckle section was deposited in this area also, they were so completely eroded prior to the deposition of the Bend as to have left no trace of their existence.

With the close of the Mississippian came an elevation of the Arbuckle region, which then became a land area, and it does not appear to have been again entirely submerged at any time. In the early Pennsylvanian sea, which follows and which surrounded but did not cover these areas, we again find similar conditions prevailing in the vicinity of Llano and the Arbuckles and extending eastward into Arkansas.

In these waters were laid down the shales and limestones known as the Bend series in Texas, the Caney shales in Oklahoma, and the Fayetteville beds in Arkansas. Both in Llano and the Arbuckles these beds were laid down as a fringe around the land mass, and the fossils are the same throughout the extent of the beds. This condition was, however, comparatively short-lived, and with the close of deposition of the Caney shales in the north and the Bend in the south another uplift occurred which still further extended the land area and raised the Lampasas geanticlinal, running north-eastward from the Llano region toward Red river, with a sea to the westward and land to the east.

In that portion of Texas east of this geanticlinal there has not yet been found the record of any deposits of earlier age than the Cretaceous, and the evidence from wells along the western border of the area proves that the Cretaceous rests upon a somewhat eroded surface of Bend materials.

To the northward in Arkansas, however, deposits were laid down both of earlier and of later age than the Caney-Fayetteville beds, and beds 15,000 to 20,000 feet in thick-

ness are found, the materials of which are thought to have been derived from a land area lying to the south that must have covered a large part of east Texas.

The Coal Measure deposits of central Texas, which accumulated in the sea west of the Lampasas uplift, also argue a land mass in this area persisting, probably, through the Pennsylvanian, but of its character and extent nothing can now be told. While it must have been of considerable size to have supplied the materials which are supposed to have been derived from it, it had, apparently, practically disappeared prior to the incursion of the Cretaceous sea.

Toward the close of the Pennsylvanian the beds of the Coal Measures east of Henrietta were, in some part, added to the land area, causing a shallowing of the sea in the Red river region; and in these waters and on the land thus formed on the east and north there appeared a new and curious vertebrate fauna which marked a distinct advance in the life history of the globe. The earliest evidences we have of these animals are the bones found in the clays, limestones, and sands deposited at this time, which now form the surface materials of Wichita, Archer, Baylor, and adjoining counties, and which we call the Wichita and Clear Fork beds. They were brought into notice first by the studies of Professor Cope, and our knowledge of them has since been greatly enlarged by later extensive collections and study by other paleontologists. So abundant are they, and so well preserved, that the entire skeletons of several varieties of them are now fully known, and we are able to reproduce their forms with accuracy.

They include peculiar and highly characteristic forms of amphibians and some of the earliest known forms of reptilian life.

The study of these remains by the paleontologists has

done much to show "the ways in which the evolution of the reptiles from the amphibians has occurred; to discover archaic forms that, one by one, bridge over the class differences between the amphibians and the reptiles; . . . but we have, nevertheless, not yet found a creature about which there is doubt as to its position" in one or the other of these classes.

In addition to these animals we find, preserved in the clays, the remains of many plants which flourished upon the land surface to the east and north; and these, too, show the decided change which took place immediately following the close of the Coal Measures by the introduction of many new and distinctive forms to take the place of other forms abundant in the preceding period, but which disappeared at or soon after its close.

Furthermore, in some of the limestone layers of these beds in Wichita county we find among marine invertebrate forms, which have persisted from Coal-Measure times into this, certain forms of ammonites which are characteristic of the Permian elsewhere, but which, strange to say, have not yet been discovered further to the south in beds of the same age which are the direct continuation of these. One of these ammonites is one of the few forms found in this region which were also found in the Guadalupean deposits.

This shallowing of the sea in the northern part of our area does not seem to have materially affected the depth of the waters farther south, since, as we trace the individual strata of the clays and sands in that direction, they become more limy, passing at length into limestones and clays. In the southern extension of this sea, as now shown by rock exposures through Shackelford, Callahan, and Coleman counties, the deposits themselves indicate a somewhat deeper sea than that in which the Coal Measures were laid down,

but otherwise very similar conditions of sedimentation; and this is further emphasized by the invertebrate fossils found *in them, which indicate that the forms of the Pennsylvanian persisted into these Permian beds (which constitute the Albany phase of the Wichita) without very marked change.* So little difference is there between the fossils of this Albany limestone and those of the underlying beds of the Cisco that for a long time many considered it a part of the Coal Measures, and even in their northern extension Dr. White, who first discovered certain characteristic Permian ammonites in the Wichita beds, called attention to the essentially Coal-Measure character of the accompanying fossils. Only a few species were found which mark the advance, probably no more than have arisen during similar intervals between two stages of the underlying Coal Measures.

This condition of only a slight change in the marine invertebrate fauna shows a marked difference from the life development of the land area immediately adjacent to it and of the same identical period, where, as we have seen, we have a well-developed Permian flora and vertebrate fauna; and it shows even greater differences from the marine fossils of the Guadalupe mountains, also of identical age, lying west of it, where open sea conditions at this same time permitted the coming in of an extensive invertebrate fauna of different species and of a decidedly later facies.

The discovery of the Guadalupean fauna was made by Dr. Shumard, over fifty years ago, while making examinations for artesian water in west Texas and New Mexico, under Captain Pope. His collections were made from the south end of the Guadalupe mountains, where the peak of white limestone known as El Capitan lifts its head 8500 feet above sea-level and reaches the greatest elevation known in our Texan area. Later examinations of these mountains

and the Delawares, which are their continuation to the south, were made by other geologists, and the Guadalupean fauna has been studied and described by Girty, who states that it has a very individual character among known faunas, though it is probably related to several. After comparison with similar faunas of other regions, he decides that in all of these there is none with which the Guadalupean can really be considered closely allied, the nearest probably being those of the Salt Range and Himalayas in India and of the *Fusulina* limestone of Palermo in Sicily. He also states that while such differences might be expected from their widely separated geographic positions, greater freedom of migration, and their environment, he thinks it surprising to find the Guadalupean fauna so completely different from anything known in the Mississippi valley, whose geographic position is relatively so close. It is no longer so when surrounding conditions are known.

These three phases, which approximately occupy the same time interval and show in such different degree the development of life which is supposed to mark the change between the Carboniferous and the Permian, illustrate a feature of geologic history which may at times be of great importance.

The open land to the north and east and the open sea to the southwest gave free entrance to the new forms of vertebrates and plants, on the one side, and the new forms of invertebrates, on the other, while in the enclosed waters of the interior sea, largely cut off from outside influence, the old fauna continued to exist with little change.

From these conditions it can be clearly seen that however and wherever these changes in land and sea fauna that mark the advancing periods may have taken place, they were not always manifested in the same region simultaneously, but when conditions were unfavorable for such simultaneous in-

cursion there may have been overlapping, one way or another, of the land fauna or flora of one period and the marine fauna of another.

The history of our Triassic time is somewhat obscure, but it is apparent that during its continuance the greater portion of the State was above the sea and subjected to extensive erosion. Our only records are found in the old basin which existed in the Staked Plain region and which may have been inherited from the closing period of the Permian. The extent of this basin is not known, but we find that it underlay the entire area of the Staked Plain; that it extended south-eastward to and beyond the Double mountains of Stonewall county, and to the north and west of the Plain into Oklahoma and New Mexico, so that the probability is that the portion within our area formed the southern extremity of a basin reaching far to the north and northwestward.

These deposits, which Cummins called the Dockum beds, are composed of sandstones, conglomerates, and clays, and the fossils show that it was a fresh-water inland basin. In them we find the fragmentary remains of batrachians and reptiles, including crocodiles and dinosaurs, which are similar to those of the same age found in the Great Basin region to the north; and along the eastern border of the lake we find banks of fossil shells of the *Unio*, of which four species have been described from one locality. These are of special interest, as has been previously stated, because of the fact that they are the earliest known forms of these fresh-water mollusks.

The Texas Cretaceous, taken as a whole, has an individuality which separates it in a measure from the Mexican deposits on the one hand, and those of the Gulf States on the other. From the latter it differs in the fact that the lower Cretaceous of Texas shows an extensive series of marine

deposits, while the beds of similar age to the east are those of fresh water, and even in the upper Cretaceous approximate identity of faunal contents is only reached toward the top of the series. From the Mexican deposits, on the other hand, it differs in a section which is apparently less complete, of a greatly diminished thickness, and seemingly of deposits of more nearly marginal character. There are also marked variations in the fossils.

It shows, moreover, certain differences within our own borders which are of greatest interest to us, and it is of these that principal mention will be made at this time.

In any general consideration of the Cretaceous deposits of the State one must bear in mind the important fact that in the greatly extended area over which this formation occurs we naturally expect variation of conditions of sedimentation and consequent differences in the sediments themselves.

If we draw a line from El Paso to a point on Red river north of Montague and follow the river to the eastern border of the State, we mark the northern boundary of all our Cretaceous deposits except those underlying the Llano Estacado. The latitudinal extent of the formation thus marked out is over 700 miles.

The exposures south of this line occupy an area roughly crescentic, the greatest width of which is 350 miles.

The eastern extension of this line on Red river and the western on the Rio Grande at El Paso are the regions of littoral sediments, while the deposits of the demilune to the south—the direction from which the sea encroached upon the land—are those of deeper waters.

Therefore the deposits of the two extremities are sands, clays, marls, and somewhat meager limestones which, as we go southward, gradually pass into clays, shales, and heavy limestones. This fact is apparent with the greater number

of the subdivisions of the Cretaceous, beginning with the Trinity.

It is quite certain that the basal Trinity sands do not reach Red river, but that the sands found there are Paluxy. Similarly, the Trinity is not known on the Rio Grande closer than fifty miles from El Paso. This indicates that land conditions persisted in these localities through a part or all of the Trinity, and the deposits which follow show that they were not submerged as deeply as the more southern territory.

The long period elapsing between the emergence of our region at the end of the Permian, extending as it did through the entire Triassic and Jurassic, gave time for great erosive action over the land surface, and this resulted, so far as can now be seen, in a fairly complete base-leveling of the greater part of the old Carboniferous land prior to the incursion of the Cretaceous sea.

This base-leveling facilitated the encroachment of the water so that the Trinity sea probably covered the land, relatively, with considerable rapidity. The gradual extension of the waters to the north and the deepening of the sea to the south is beautifully told in the sediments exposed along the Colorado river on the eastern border of the Llano region.

The erosion of the Colorado and its affluents has channeled through the entire thickness of the early Cretaceous beds, clearly showing the basal sands of the Trinity with the overlying arenaceous limestones of the Glen Rose. These attain their maximum thickness north of Austin, thinning toward the northwest, and by following the outcrops of the various beds of limestone in that direction we find that they finger out into the underlying sands, showing that they are but deposits in the deeper waters of the sea of which some portion of the Trinity sands are the contemporaneous lit-

toral sediments. Just as the Trinity grades upward, imperceptibly, into the Glen Rose, so do these limestones, in turn grade upward into the sands of the Paluxy, where it is present, so that at many localities there is no apparent sedimentary break between them.

The thinning of the beds continues to the north and west of the Llano region until the Glen Rose beds entirely disappear and the Paluxy sands are directly superposed upon the Trinity, while further north it is probable that the Trinity itself is entirely lacking and that the basal sands, if present, represent only the Paluxy or even some later stage.

Page calls attention to the fact that the entire Trinity is missing at several places in Burnet county, apparently through non-deposition, and that the Walnut clays and Comanche Peak limestone directly overlie the Ordovician limestone. Thus the 500 feet of Trinity and Glen Rose sediments which are exposed in the Colorado near the Burnet-Travis county line thins out entirely in the distance of 25 miles, due to the fact that parts of the land at the more northern locality, even at that date, stood too high for the sea to engulf them.

On the southern border of the Llano region this condition is even more noticeable than on the eastern, for there the granite peaks more clearly show the conditions of deposition that surrounded but did not cover them during the Trinity and Fredericksburg periods.

Other detached areas lying some distance to the southeast of Burnet were similarly too high and formed islands in the Trinity sea, but these were covered by the succeeding Comanche Peak sediments. Several such have been found in drilling for artesian water.

The absence of the Trinity has also been noted in some of the buttes lying east of the Staked Plain.

Such uncovered areas, however interesting they may be geologically, form so small a percentage of the great surface covered by this mantle of sand east of the Pecos as to be practically negligible when we study its economic value as the source of so large a portion of our artesian water.

The Rio Grande discloses conditions somewhat similar to those between the Colorado and Red river. Exposures in or near the river valley in the vicinity of the Chinati, Quitman, and Malone mountains show the basal sands and overlying Glen Rose limestones in strong development. In the vicinity of Presidio the basal sands seem to have a thickness of 400 feet and the Glen Rose 700, while on the south slope of the Quitmans there is a series of sandstones and silicious limestones apparently of great thickness underlying the beds referable to the Glen Rose and which are here 900 feet thick or even more.

To the northward, across the railroad, these beds show a greatly diminished thickness, soon thin out entirely and are overlapped by later deposits. The most northerly and westerly occurrences known are those of the ridges just north of Sierra Blanca, Flat Mesa, and the Finlay mountains.

The Fredericksburg also presents different facies in different localities. In its typical development it comprises three members—the Walnut clays, the Comanche Peak beds, and the Edwards limestone. These three divisions are clearly recognizable over a very large area east of the Pecos, including the line of buttes which form the Callahan divide and the outcrops south of the Llano region.

Throughout a large portion of this area the Edwards limestone consists of deposits laid down in clear water of some depth, far enough from shore to escape the admixture of terrigenous sediments. In the region of shallower water

along Red river it shows an increase of coastal debris, and many of the fossil forms characteristic of its purer phase do not occur in it. It is in fact no longer separable from the underlying Comanche Peak beds, and the two are, therefore, considered as the Goodland limestone, which at its best attains a thickness of only a few feet.

Going southwestward from Austin toward the Pecos and trans-Pecos region—a region which was covered with deeper waters for a long period of time—we find that the Comanche Peak marls gradually change to limestone and the Walnut clays to marls and limestones, both finally coalescing with the overlying Edwards so that there is no longer any lithological difference between them. In such case their presence can be known only through distinguishing fossils. In this manner, due entirely to different conditions of deposition, we have in places the limestones of the Fredericksburg resting directly upon the Trinity.

Still further west in the Rio Grande region we find, on the contrary, thin beds of sandstone coming in and separating these beds of limestone, and to the northward across the railroad lines the sandstones thus occurring become thicker and the limestones are also silicious, indicating that the deposits were laid down nearer a shore-line.

It is, therefore, apparent that in this immediate area the shore-line of the Cretaceous sea maintained an approximately constant position from early Trinity time to well through the Fredericksburg. This line was probably not more than 50 to 60 miles southeast of El Paso. That the sea did not include El Paso during this period is shown by the absence of deposits there which can be referred to it.

Between the Finlay-Sierra Blanca region and El Paso later deposits cover and conceal any extensions of the Cretaceous beds that may exist, and the next exposures to be seen

are the basal beds of limestone of the Muleros mountains. These seem to represent practically the top of the Fredericksburg, and show only a small development (70 feet) beneath the overlying marls in which Washita forms appear.

Here again, as noted in the Red river section, in the beds referred to the Fredericksburg we miss the characteristic fossils of the Edwards limestone, and find instead an assemblage of forms which more nearly resemble those of the Goodland limestone.

Similarly, too, the deposits referable to this division in these two regions of shallow water exhibit only a small portion of the thickness attained by the beds in the off-shore areas.

The Fredericksburg, with its extensive development of deep sea limestones and comparative poverty of shallow water sediments, was followed by the Washita, in which these conditions are largely reversed. It is in the littoral regions of Red river and El Paso that the deposits of the Washita show their widest differentiation and greatest thickness, while in the deep sea area they are less variable and in most cases of less thickness. In its simplest expression the Washita is composed of a basal limestone, the Washita or Georgetown, overlain by the *Exogyra arietina* or Del Rio clays and the Buda limestone. This is the section at Austin and south and westward to the trans-Pecos region.

Going northeastward from Austin toward Red river, the Buda limestone, which is 80 feet thick on the Colorado, gradually thins out, and beyond the Brazos it is no longer distinguishable even through its fossils, although it seemingly is found again north of Red river in Oklahoma.

The Del Rio clay, however, with a thickness of 80 feet at Austin, maintains a similar thickness to the Brazos, beyond which stream it is gradually expanded into a series

of shales, marls, sands, clays, and limestones known as the Denison beds, with a thickness of 200 feet at Denison.

Similarly, the Washita limestone, with a thickness of 80 feet at Austin, shows a separation into several members when followed northward.

In the Red river section the Kiamitia clays form the base followed by the marls and chalky limestones of the Duck creek beds, capped by the Fort Worth limestone, and these together show a thickness twice as great as the Georgetown limestone at Austin.

The fossils of these various subdivisions of the Washita are very numerous and characteristic. Many of them are seemingly confined to the nearer shore deposits of the northern border, but others are as wide-spread as the formation. By far the greater number and the greater variety of species found within the several beds of this division are those of the shallower water. In the deeper sea conditions were more stable and there were fewer changes of form—so little, in fact, that in the vicinity of Devil's river and further west certain aberrant forms which are characteristic of the Edwards limestone throughout its extent have persisted and are found in the Washita (Georgetown) limestone as well.

As has been stated, the section south of Austin is more regular than that to the north of the Colorado. The basal limestone shows a decrease in thickness in some places, and is so similar to the underlying Edwards that it can be distinguished from it only by the fossils that it carries. This is true as far west as the Chisos mountains and also near Sierra Blanca.

The Del Rio clays have often been mentioned as a formation of rather remarkable regularity for one of its composition. This distinctive clay bed is nearly always present in approximately the same thickness and is characterized by

its peculiar fossil, the *Exogyra arietina*. It carries numerous other forms, especially toward the top, but nothing like the number that are found in its northern development on Red river.

The Buda limestone also maintains a rather constant thickness and character throughout all this section.

In some parts of the trans-Pecos the Washita occupies a very prominent place among Cretaceous deposits, as it was during this period that the Cretaceous sea, which had been held back so successfully during the Trinity and most of Fredericksburg time, spread northward over the former land area lying east of the Guadalupe to and beyond the northwestern border of the State, overlapping the Fredericksburg and the Trinity, or, more probably, the Paluxy.

This is particularly well shown in the vicinity of Kent on the Texas and Pacific railroad. Here there is no Fredericksburg visible at the surface, and what is found in excavations is rather of the nature of the Goodland limestone phase. No Edwards limestone is known. South of the railroad track the Washita limestone is well developed, with great numbers of fossils. As we go northward we find the Paluxy sands underlying the Washita and successively higher and higher beds of the limestone coming down into direct contact with it. The Washita materials are not found overlying the other Cretaceous of the Llano Estacado, but the section of Tucumcari mountain shows, directly overlying the Triassic, beds of the Washita with fossils similar to those at Kent. Consequently, it is very probable that it did cover the plains at some time. At Kent the clays of the *arietina* have not been observed, although they are found in their regular position at points south.

The Buda limestone, however, does occur with its usual fossils.

In the Big Bend of the Rio Grande, including Presidio, Brewster and adjoining counties, the exact line of separation between the Washita limestone and that of the Fredericksburg is difficult to find, owing to the great similarity of the two. The Washita becomes softer and more shaly toward the top and can be recognized through its fossils. Its thickness in the region adjacent to the Rio Grande is variable, just as is that of the Fredericksburg, and, like it also, it at times far exceeds anything that is known further north and east.

The Del Rio clays are usually present, although the *Exogyra arietina* is not always to be found in them. The Buda forms the capping stratum, as usual.

Going northward from the river, the Washita becomes more marly in character, as has been noted in the Kent section. West of Sierra Blanca the Washita only occurs in remnantal patches which show sandy shales and sandy limestones with fossils of this period, with a total thickness for the entire division of not much over 100 feet. Here, in its more northern exposures, it overlaps the Fredericksburg and is imposed directly upon the Carboniferous.

The difference in the conditions which existed in the eastern and western portions of our area is shown by the variations in the horizons of certain fossils occurring in them. In the Red river region the little *Exogyra plexa* is found in the Kiamitia clay, corresponding to the lower part of the Washita limestone. At Kent and further west it occurs either at the top of the Washita limestone or in the Del Rio clay. On the other hand, the *Nodosaria texana*, which throughout the east is confined to the Del Rio clays, is found in the Sierra Blanca-Malone region in the Washita limestone and Fredericksburg as well.

In the Muleros mountains we find a development of the

Washita which differs in many particulars from that of other portions of the trans-Pecos, and, while possessing features distinctly its own, is more nearly similar to the Red river section.

Beginning at the base, there is a band of clays and clayey limestones followed by ledges of harder limestones and overlain by a considerable thickness of clay shales with indurated limy bands, the fossils of which seem to show a close relationship with the Preston beds of the Red river section. These beds and their fossils, taken in connection with the underlying limestone, give a section which, in its assemblage and distribution of fossils, shows a close resemblance to that on Red river including the Goodland limestone, Kiamitia clays and Duck creek beds.

Succeeding these are flaggy argillaceous limestones with marls and shale partings a hundred feet in thickness, which are, stratigraphically and in a general way, the faunal correlates of the Fort Worth limestone.

Following this, the Del Rio clay is here represented by brown sandy calcareous layers passing upward into clay shales and lime bands alternating with sandy flags containing both *Exogyra arietina* and *Exogyra plexa* as well as other Del Rio fossils. These beds are in turn capped by red, gray or white sands varying in thickness from 60 to 300 feet.

This massive sandstone is followed by clay shales with bands of limestone nodules, passing gradually into a hard limestone. This carries the fossils of the Buda limestone, including *Hemiaster calvini*.

The entire thickness of the Washita section in the Mule-ros mountains is 600 feet or over—fully 200 feet more than the Red river section. This difference is fully accounted for in the body of massive sandstone which is found here between the Del Rio clay and the Buda limestone, the only

occurrence of the kind known within our entire area. The only similar occurrence which is now known is the sandstone which occurs at the top of Washita deposits in Tucumcari mountain. A peculiarity of the sand at Muleros is the number of large shells of the *Exogyra clarkii* which are found in it and which continue upward through the overlying marls and limestones of the Buda.

The earliest deposition of the upper Cretaceous consists of the sands of the Dakota or Woodbine series, which are found in Texas in both littoral zones. On the east they form a sandy belt known as the Lower Cross Timbers, extending from Red river to the Brazos at Waco. In the west they are found in the Muleros section and in one or two outlying exposures, such as that at Eagle Flat, 20 miles east of Sierra Blanca. The time relation of these marine deposits to the brackish or fresh water beds of the interior is proved by the identity of the fossil flora found in both, in addition to which our beds both east and west carry a marine fauna which is distinct from that of the lower Cretaceous. As has been previously stated, the Dakota is absent throughout the greater portion of our area, and the succeeding beds of clays and shales which we call the Eagle Ford, and which are stratigraphically and faunally the continuation of the Benton shales of the interior region, are the lowest member of the upper Cretaceous which we find.

From Red river southward the clayey members decrease and the limestones persist and increase in thickness until along the Rio Grande between Del Rio and Eagle Pass they are lime shales almost exclusively. In the Big Bend of the Rio Grande they are lime shales at the base, grading upward into marly clays, and in the Muleros section they consist of fine-grained sandstones, and shales with some silicious limestone.

Of all the upper Cretaceous deposits, the Eagle Ford seems to be the most uniform and constant. While it has its near shore phase of sands and clays, the bulk of the deposits are limy shales, and these not only encircle the Edwards plateau, but stretch southward into Mexico for two hundred miles or more, where they attain a very much greater thickness than anything we know in Texas. Furthermore, these deposits, wherever we find them, whether sands or clays or lime, are consistently shales and carry a characteristic fauna throughout their entire extent.

During the deposition of the Chalk a condition of clearer waters existed, and in the main the Chalk is fairly free from materials derived from the land area and is an almost pure chalk, but there are localities where the clays were carried out and deposited with it, occasionally to such an extent as to make it merely a chalky marl.

In its relation to the underlying Eagle Ford it shows the same variations noted in other similar contacts. In the eastern part of the State the division is quite clearly defined and the line of separation can be fairly well made out even on the Rio Grande east of Del Rio. To the south it is sharply defined, but to the west the distinction is not so readily apparent, and in the region of the Big Bend of the Rio Grande, where the Eagle Ford takes on a more marly character and the Austin chalk is marly also, it is difficult to find the dividing line without careful examination of the fossils.

The upper margin of the Chalk is not so well defined, since at most places it grades almost imperceptibly into the base of the overlying Taylor marls.

On the eastern border the Taylor marls and Navarro beds, as a whole, mark a period of gradually shallowing water, interrupted, however, in the northern part for a time

by conditions of deeper, clearer waters in which the Anona chalk was laid down.

On the Rio Grande border also we find in the region lying between Eagle Pass and Uvalde a very considerable variation of the deposits belonging to these formations. Along the river below old Fort Upson the representatives of the Taylor and Navarro are found for a distance of 40 miles and include various members not present further east.

The basal beds or Upson clays are marls similar to the more eastern deposits and carrying calcareous nodules which are septarian in form. These are followed by the San Miguel, a series of sandstones and clays with glauconite which passes upward into more calcareous strata, also glauconitic. Fossils are abundant throughout the entire series. Overlying this there are other sands and clays with beds of coal, one or more of which are workable. While the area of workable coal in Texas is not very great, the extension of these beds south of the Rio Grande in Mexico furnishes the principal Coal Measures of that republic.

The upper beds of the formation are sands and clays with bands of limestone, reefs of oyster shells, and many other fossils which are known as the Escondido beds. The entire series has a thickness of more than 2000 feet.

Going northeastward toward Uvalde from this extensive exposure along the river, these various beds gradually coalesce, and in the southeastern part of Kinney county we find them represented in the Anacacho mountain by a small thickness of the basal clay passing into the Anacacho limestone, which is covered by a comparatively small amount of the upper portion of the Escondido beds. These have here a total thickness of not more than 400 feet, and this is less than 30 miles from the river.

The Anacacho limestone is largely made up of broken shells and remains of sea organisms, and apparently represents in time and general character the Anona chalk of the eastern portion of the State.

The coal-bearing character of the Taylor marls is also exhibited in the Rio Grande valley around San Carlos in the northwestern portion of Presidio county. In this region the base of the section is composed of shales with lime concretions overlain by interbedded sands and sandstones which are more or less calcareous. Then follows a considerable thickness of coal shales with two beds of coal overlain by red and brown sands capped by a lava flow. Overlying the lava bed we find a conglomerate passing upward in sandstones of various colors interbedded with coal, calcareous clays, and volcanic ash. These beds have a thickness of over 2000 feet and are capped by the heavy lava flow which forms the rim rock of the Sierra Vieja.

It would appear from the data so far obtained that the coal of this region is somewhat lower in the section than is that at Eagle Pass.

We have in this region, therefore, conditions of coal formation which, in a measure, correspond with those of the Montana beds of the Interior Basin region, and which are the correlatives of these in age; but the fossils which are found in great abundance in both of the Texas regions, while in part similar to those of the Interior Basin region, are more nearly akin to those of the Ripley of the upper Cretaceous of the Gulf.

The occurrence of basalt and volcanic ash in connection with the Taylor marls in the Austin region, as well as in the far west at San Carlos, gives an idea of the wide-spread activity of the igneous forces which came into operation dur-

ing the close of the Cretaceous and must have continued well into the Tertiary.

What has already been stated regarding the Eocene deposits of our State gives in a general way their relations to and differences from beds of similar age in adjoining regions.

The Lignitic, which in the northeastern portion of the State carries such vast bodies of lignites, gradually loses these toward the southwest, and beyond the Guadalupe these features are practically absent.

The Queen City beds of the east, with a thickness of less than 100 feet, increase on the Rio Grande to several times that thickness, and the overlying Yegua and Fayette, the fossils from which are almost unknown in the east, carry a very plentiful fauna on the Rio Grande. Taken as a whole, however, the different substages are very constant in their composition and characteristics entirely across the State.

Of the later beds of the Tertiary there is little more that can be said. So recent has been their emergence from the sea, and so little have they been disturbed by erosion or earth movements, that it is difficult to get any real information of them, except what they themselves show upon their surface.

In the later Tertiary deposits, both of the Llano Estacado and of the Coastal Plain, we find remains of the abundant animal life of the period, most of which is now extinct or unknown on this continent.

Herds of mastodon and elephants of different species roamed over this area. Camels of various kinds, gigantic species of ox (*Bison latifrons*), of the sloth (*Megalonyx*), the armadillo (*Mylodon*), and land tortoise existed, together with peccaries, wolves, foxes, and many smaller ani-

mals. The saber-toothed tiger, a species of lion, and the rhinoceros are also found.

Horses, which appear to have become extinct before the discovery of the continent, are represented by numerous species ranging from the three-toed variety to an animal of immense size which is found in southwest Texas.

One of the most interesting chapters of our history would be that of the igneous rocks, but so little have they been studied up to this time that there is little that can be safely stated of them.

The basalts that accompanied the vulcanism of late Cretaceous time from Pilot Knob near Austin to Fort Inge have been mentioned, as also the beds of volcanic ash which are found intercalated in certain horizons of Tertiary rocks. It is in the trans-Pecos region, however, that these forces have their greatest manifestation, and here they have yet to be studied.

The peaks of Sierra Blanca are composed principally of igneous rocks, but we as yet know nothing of their history, nor are we sure of the age of the granites of the Quitman range.

In the Eagle mountains, however, we find great shafts of porphyry thrust skyward through rocks of upper Cretaceous age, and similar protrusions occur in many of the mountains to the southeast. In the Sierra Viejas a capping of basalt 300 feet in thickness was spread over the top of the upper Cretaceous beds before the great rift occurred which, in the vicinity of San Carlos, caused a dislocation of fully 2000 feet in the separated portions of these beds. In some places the basalts or porphyries, instead of reaching the surface, were thrust along the planes between beds of limestone or other material and are now found as sills in them, and at

others vast bodies of tuffs or volcanic ash are interbedded or commingled with the deposits.

In the Terlingua region three distinct periods of vulcanism were made out, each accompanied by characteristic eruptives, and their relative ages determined; but as to the actual time of their activity nothing could be determined save the fact that it was after the deposition of the lower Cretaceous, since these rocks were cut by them.

This branch of our history, therefore, like that of our more recent coastal land, must await more study before we can appreciate its full significance.

III

ECONOMIC FEATURES

THE various facts which have been observed and recorded regarding the geologic history of our State, and which have been briefly touched on here, show the manner in which it was brought into being, and in which the various formations were laid down, their relations to those of other regions and the character of life they evidence. These facts have a decided interest not only for scientists but for all thinking people. There is, however, still another phase of this geologic history which must also be of interest to every one, and that is the part which geologic processes have played in fitting the land for habitation, by preparing the soil and storing up water and fuel as well as in producing and preserving stores of valuable minerals for our use and comfort. This is the utilitarian side of geology, the value of which is coming to be more and more fully recognized.

The importance of a correct understanding of the geologic features of the region in this connection will be readily seen when we consider that practically all materials of economic value, such as ores, minerals, coals, oils, artesian water, etc., that occur within our borders, are found in some definite relation to one or the other of the various geologic formations that have been discussed; and any real investigation of these materials, looking toward their proper utilization, must take into consideration the fact and character of this relation and include the study of its geological significance.

It is my purpose here to enumerate the more important of

these materials as we now find them, and to indicate briefly the relations between them and the rocks with which they are associated.

Among the granites and associated rocks of pre-Cambrian age in the Llano region there are many varieties of stone which are well suited for building as well as for decorative and monumental uses. Besides the red or pink granite, of which the State capitol is built and which enters into the structure of many other buildings, both public and private, in various portions of the State, there are gray granites, serpentines of different colors, quartz porphyry, etc., many of which stones are susceptible of high polish and will, in time, be used extensively.

The Texan marbles will also furnish a limited supply of desirable ornamental stone, occurring as they do in beds of medium thickness, even-grained and fully compact in structure, and of a snowy whiteness.

It is in connection with this group of pre-Cambrian rocks also that the principal mineral deposits of this region are found.

There are legends of "lost mines" of fabulous value in the Llano region; but although many men have made determined efforts to find them, all search for them has been in vain. Among these was the Bowie mine, supposed by some to have been in the Honey Creek region in the southeastern part of Llano county, but held by others to be farther north and west.

The story, which was formerly believed in by some who were contemporaries of Bowie and who spent much time in a search for it, is, briefly, that somewhere in this region Colonel Bowie found a cave or an old Spanish working in which native silver occurred in such large quantity that it could be cut out with a hatchet, and that when he left it he concealed

the opening. As a result of this search, caves and old workings have been found, but no trace of the wonderful silver-mine has ever been discovered.

Some placer gold has been recovered from the sands along Honey and Sandy creeks south of Packsaddle mountain, which probably comes from the disintegration of some of these older rocks, and small quantities, probably having the same origin, are found in the sands of the Colorado river as far south as Austin.

Years of prospecting in this region have brought to light, in the pre-Cambrian mica-schist, a few quartz stringers which carry gold in small quantity, and in the granites and schists some small veins of galena carrying silver, and irregular deposits of copper glance carrying both gold and silver. Platinum is also reported, and some work has been done at the locality where it was found. Many others of these occurrences have been prospected, and on some of them shafts of considerable depth have been sunk, but up to the present no workable deposits of the precious metals have been commercially developed.

It is believed by some in this region that further work on the copper-silver deposits of the northwestern part of Llano county will yet result in the development of paying mines. These copper deposits are found in the Babyhead region and west of Pecan creek. Considerable areas are found in which the highly colored carbonates are spread over the surface, and a number of shallow pits and tunnels were dug on these many years ago. The ores found were the carbonates with some sulphides—erubescite, gray copper, and pyrite—but only one locality afforded ore enough even for a small shipment. At another locality a considerable amount of ore was found in prospecting, but no shipment was made

and no development has followed. It does not seem probable, therefore, that these ores occur in sufficient quantity to make mines of any considerable value.

The conditions in the trans-Pecos seem to have been more favorable, and workable ores of copper, lead, and zinc, principally silver-bearing, are found in connection with the granites of the Quitman mountains, the Hazel sandstone of the Diabolos, and the schists of other mountain ranges of the area. Some silicious gold ores are also found.

The Bonanza and Alice Ray mines in the Quitman mountains show veins of galena and blende which carry silver and some gold. These have produced some shipping ores and will probably become steady producers when conditions permit. There are many other prospects in these mountains, some of which appear to be well worthy of further investigation.

The Hazel mine in the Sierra Diabolos, north of Allamore, has produced a considerable amount of gray copper and copper glance carrying good values in silver, and similar ores are found in other less developed prospects in the same vicinity.

In the other ranges prospecting has developed good indication of ores in rocks of this period; and while little mining has been done, the prospects are that good mines may yet be opened in them.

The lack of development of these deposits of precious metals is no doubt largely due to our land and mining laws. In this State the owner of the land is owner of all minerals occurring under it. The trans-Pecos region is largely occupied by blocks surveyed under various railroad grants, in which one-half the land is under private ownership, leaving the alternate sections alone belonging to the State or to the

schools or asylums; and it is only such of these State, school, or asylum lands as have not already been disposed of, which can be granted under mining laws. These conditions render prospecting so risky as practically to prohibit it, since even if mineral be found, the chance of getting title to it is altogether too uncertain.

When the region is better settled and the land lines more certainly known, this condition will be remedied and these valuable deposits will be sought by owners or prospectors, and the development that will follow will add greatly to the wealth of the State.

The iron ores of the Llano region have been long known. They comprise magnetites and hematites with only a small measure of limonite. The magnetites occur in connection with the pre-Cambrian rocks. The hematites and limonites, probably derived from these, are connected for the most part with the succeeding sedimentary deposits.

The magnetites occur as large lenses or bosses and have been pretty thoroughly prospected and their area determined by drilling. Many of them are of excellent quality and will furnish a large quantity of high-grade ore for use in connection with the smelting of the brown ores of east Texas. The origin of these ores is not definitely known. If it should prove that they are derived from the alteration of sulphides, their excellent quality may not be found to continue downward as far as is now believed probable.

Similar iron ores are found in west Texas also, but no work has been done on them.

Deposits of workable manganese ores occur in the eastern portion of Mason county, where they were prospected years ago at what was known as the Spiller mine, but no mining has ever been attempted.

Traces of tin ore have also been found in the Llano re-

gion, and it was reported from this region by the Geological Survey. Later other parties found some stream tin in the eastern part of Mason county, in connection with crystals of topaz, but up to the present time no special work has been done on it.

In the Franklin mountains, however, 15 miles north of El Paso, tin ores occur in well-defined veins in connection with the granite, which is here supposed to be intrusive and later than the Cambrian beds.

Seven veins have been exposed by open cuts and are said to exhibit the usual characteristics of the tin beds of Cornwall. The surface values are good, a considerable area has been prospected, and some mining carried on. A small mill and reverberatory furnace were erected and several tons of very pure tin were made, when operations were temporarily suspended.

At Baringer hill, on the west bank of the Colorado river some 20 miles east of Llano, there occurs a deposit of rare-earth minerals which, so far as now known, is entirely unique, since at no other place have they ever been found in such large masses or in such quantities as here.

These minerals, which are valuable chiefly for their contents of rare-earths of the yttrium group, include gadolinite, fergusonite, allanite, and cyrtolite, with smaller quantities of a number of other species.

The hill was named for Mr. Baringer, who made the first discovery of gadolinite in 1887. It is not over 50 feet in height, is 100 feet or more in width, and between 200 and 300 feet in length, and owes its existence to the superior hardness of the pegmatite dike of which it is composed to the porphyritic granite into which it was intruded. In the center of the pegmatite there is a large mass of quartz, while at its outer edge, in contact with the granite country

rock, there is a band of very perfect graphic granite. The minerals occur both in the quartz and in the feldspar, but for the most part along the outer portion of the dike.

Gadolinite is the most abundant of the minerals and occurs in crystals and masses of irregular shape, sometimes weighing as much as 200 pounds, single crystals having been found that weighed over 70 pounds. One mass of allanite was found weighing over 300 pounds, and correspondingly large quantities of fergusonite, thoro-gummite, etc.

The radioactivity of some of these minerals is manifested by tanning the faces and arms of those who mine them.

The property is now controlled by parties who mine only such quantities of the minerals as are needed to furnish the incandescent glower used in the Nernst lamp.

There are other mounds of similar origin and structure in the vicinity in which small amounts of these minerals have been found, but so far no other locality has given promise of yielding them in commercial quantities.

The massive limestone of the Ordovician is very variable in character, and much of it has no special value as structural material. There are, however, in that portion of the formation called by Comstock the Hoover division a series of semi-marbles which give promise of yielding a large amount of very valuable structural and ornamental stone. These Burnet or San Saba marbles are even-grained, tough, and compact, and admit of a fine polish. Some are homogeneous in tint; others are variegated. The colors are white, pink, buff, and several shades of gray and blue. They occur at various points in Llano and surrounding counties, and it is only a matter of time when they will become the basis of a considerable industry.

The only ores of value that are found in connection with the Cambro-Ordovician rocks are the beds of hematite and

limonite iron. These occur at many localities through the Llano region, and analyses show that many of them are high in iron, although a number are also high in phosphorus.

Up to the present time, however, little or no prospecting has been done on the various outcrops, and we know, therefore, very little as to the real extent or value of the deposits.

The Carboniferous rocks of the west are deposits of the sea, with little or no admixture of materials derived from the land, and they show no coal-beds nor deposits of petroleum, nor are any mineral deposits known in them.

The rocks of the Pennsylvanian in northern Texas, however, toward which the wash from the land surface contributed a great amount of material, contain deposits of coal, petroleum, and gas which are of very great value.

The Bend division, which is the continuation of the Caney shale of Oklahoma, like it, is highly bituminous and yields both oil and gas. Up to the present the yield from wells drilled into it in our territory has not been very large, but is sufficient to prove its character as an oil-bearing formation and to warrant a careful investigation into its structure in an effort to locate more favorable points for drilling.

This is especially true of the region east of the Lampasas geanticlinal, where the Bend is overlain by the Cretaceous.

In the Strawn division, which overlies the Bend, we find the seam of coal which has been worked for so many years in Parker, Palo Pinto, and Erath counties. While the bed is not as thick as many of those of Oklahoma, the coal has proved very serviceable and an acceptable fuel. The outcrop of the coal-bed, beginning at a point a few miles west of Decatur, extends southwestwardly across the counties named until it passes under the Cretaceous hills northwest of Stephenville. Mines have been opened at different points, but those along the Texas and Pacific railroad have

been most fully and successfully developed, probably because of the better facilities for transportation.

The Cisco, or upper division of the Pennsylvanian, of this region also carries a seam of coal, the outcrop of which can be followed from Bowie across Jack, Young, Stephens, Eastland, Brown, and Coleman counties to the Colorado river. The thickness of the seam is variable and in places it is too thin or too impure to work, but the extension of rail lines along it has caused its development at the more favorable localities and it is furnishing large quantities of excellent fuel. From present indications it bids fair to rival the lower seam in production.

The economic value of the Cisco division is not, however, found alone in its coal-bed; for to the westward it is the principal source of the oil and gas which are being produced in the region extending from Burkburnett, on Red river, to the Texas and Pacific railroad. During the last four years a number of oil-pools have been opened up in this region, including Petrolia, Iowa Park, Fowlkes, Electra, Burkburnett, and Moran.

The oil is of very high gravity and has a paraffin base. The wells are from 700 to 1900 feet or more in depth, and the production for 1913 was nearly 9,000,000 barrels.

The indications are that other producing pools will be found, and that the oil territory may spread nearer to the foot of the plains.

Vast quantities of natural gas are also found, and many cities and towns are now being supplied with it from wells drilled into this formation.

In all such occurrences the geologic structure is one of the prime factors. As we have seen, we have here a synclinal basin, the axis of which is probably east of the border of the

plains. The oil was deposited either already formed or as fatty matters derived from partial decay of animal and vegetable remains which were later transformed into oil and gas by fermentation or pressure-distillation, and these oils and gases, acting under natural laws, are concentrated in the more elevated portion of folds in the inclosing beds. No great amount of orogenic action has occurred here, and consequently the lines of uplift are small and often masked by later deposits. While this is true, the chances of finding oil and gas along such lines are so much greater than in ordinary "wild-catting" that every effort is being made to locate them and so lessen the chances of getting dry holes.

The region is now being carefully studied by several corps of geologists who are endeavoring to locate such existing structural lines as may in any way influence the concentration of the underground oil supply, as an indication of suitable places for drilling new wells.

In the trans-Pecos area the limestones of Permian age form the country rock of the ore bodies which have been worked for many years by the Presidio Mining Company at the mines on Cibolo creek northeast of Presidio del Norte. The silver ores which occur here are found in cavern-like openings or chambers in the limestones which are connected by fissures of less or greater width. These mines have been the most reliable and productive yet found in Texas, and have been worked since the year 1884.

The principal ore is horn silver or silver chloride, although pockets of galena rich in silver also occur, together with smaller amounts of other lead and zinc ores.

Similar deposits of zinc ore also occur in these limestones in this region, but have not yet been mined to any extent.

The principal mineral deposits occurring in connection

with the Permian rocks of north Texas are gypsum, salt, and copper; while west of the Pecos, in addition to the mineral deposits, oil and sulphur are also found.

The copper of this formation does not occur in veins as in the older rocks, but it was deposited in beds of blue clay at or near the time they were laid down beneath the waters. Whatever may have been the origin of the copper, it was probably carried in solution in the percolating waters and precipitated by the action of the organic matter carried out with the clays and sands.

It now occurs scattered through these clays in the form of sulphide of copper, which, near the surface, has been oxidized and now shows stainings of copper carbonates. In places it is more concentrated and is found in the form of nuggets or as replacements of fragments of wood or even whole trunks of trees, and of the bones of animals. Such deposits are frequently of considerable value.

The beds of clay are from three to four feet thick and are continuous over long distances. The copper disseminated through them is more abundant in some parts than in others, and in places is in sufficient quantity to make mining possible if the ore could be separated from the clay.

There are three distinct horizons at which the copper occurs. The first is in the Wichita beds, and its outcrop begins on Red river near the mouth of Cache creek (where it was first observed by Captain Marcy in his exploration of Red river in 1852), and extends southward through Archer county.

It is from these beds that the largest amounts have been taken. Pockets carrying several thousand pounds of high-grade ore were found some years ago and the material shipped, but nothing has been done with them lately.

The second bed is found in the Clear Fork division, ex-

tending from Buffalo Gap northeastward by way of California creek in Haskell county on to Red river.

The upper beds are in the Double mountain division and occur at Kiowa peak, Buzzard peak, and Cedar mountain, at the head of Raggedy creek and the north side of Pease river.

The occurrence of this copper in this manner is somewhat similar to that of the copper ore found in the Permian of Germany, which has been the basis of an industry employing 50,000 men and producing both copper and silver.

The Texas clays are not so bituminous as those of Germany, the beds are thicker, and the copper ores are for the most part disseminated through the entire thickness of the bed instead of being concentrated within the bottom twelve or fifteen inches. In the Mansfeld district, also, vast quantities of water are encountered in mining the copper shales; while in Texas the ore occurs in a region so dry that there is not sufficient water supply to wash and concentrate the ore properly.

Only the richer pockets have so far been utilized, and these are so separated and of such uncertain occurrence that no regular mining has been done on them. It is hardly probable that this copper, vast as it must be in aggregate amount, will be utilized until some cheap process of separating the ore from the clay has been devised.

The gypsum deposits of the Permian cover an extensive area and are of such great thickness that they are practically inexhaustible for all uses now known. They are found both in the region lying east of the Staked Plain and in the valley of the Pecos west of that plateau. On the eastern side of the Plain they extend from Red river to the line of the Texas and Pacific railroad in a belt from 20 to 50 miles wide. The beds are of varying thickness. Some are no

thicker than a knife-blade, and others are 30, 40 and even 60 feet in thickness. *The material is found in clear transparent masses of selenite, in compact snowy beds of alabaster, in beautiful rounded masses of thin rose-like leaves, colored reddish pink, known as "rose gypsum," in massive beds, and as a pulverulent sandy mass known as gypsite. This last is the material of which the cement plasters are made, and is the variety which is at present most sought for manufacturing purposes, being the basis of operations of several large mills near Quanah.*

The deposits west of the Plain are of equal value with those east, but, owing to their location, have not yet been opened up.

This gypsum is an integral part of the geologic history of our State. It marks distinct stages in the evaporation of the waters of the Permian sea when it was so shut off that not enough fresh water could enter to hold these mineral salts in solution and thus the gypsum and salt were deposited.

The gypsum-beds, by reason of their insolubility and resistance to erosion, form permanent benches throughout the area, while the salt-beds, because of their ready solubility, are not so well known. The salt manifests itself, however, in numerous salt springs and wells in the Permian area. All the rivers and streams passing through the area are more or less impregnated with it, so that at low stages some of them are almost brine. For miles at such times the banks of the rivers are as white as snow. Salt Croton creek is especially briny. All the rocks around the falls above its junction with the Brazos are incrustated with salt, and the water of the pool below the falls is of a density approaching that of Great Salt Lake. Salt is deposited along the banks in sheets and is gathered for use. This salt, of course, has its origin in the deposits in the clays of the Permian, from which it is dis-

solved by percolating waters, brought to the surface, and redeposited.

Beds of rock-salt also occur, but they have been utilized only by wells at Colorado Springs, in Mitchell county, where, in boring for water, rock-salt was encountered at a depth of 850 feet. Below this depth there were found, within a distance of 250 feet, strata of rock-salt with a total thickness of 140 feet. Water is found in connection with the salt-beds, and this rises to within 170 feet of the surface. It is a saturated brine and seems inexhaustible. It is pumped to the surface and evaporated, and has been utilized for many years in the manufacture of a fine grade of salt.

In the region around San Angelo where the rocks of the Albany division are found in good exposures they contain beds of shales and limestones that are distinctly petroliferous. Asphalt has been reported from wells in this vicinity, and it is probable that the indications will lead to the sinking of test wells at least.

Between the Delaware mountains and the Pecos river both oil and sulphur are found at numerous localities in connection with the Permian deposits, and in some cases apparently in connection with those of Quaternary age as well.

Several wells drilled in the Toyah valley have encountered small quantities of oil at comparatively shallow depths, and deeper drilling has shown a number of petroliferous beds underlying it. The uppermost beds are found in connection with the pulverulent gypsum and other late deposits which form the surface materials, while the lower beds are either Permian or Cretaceous. So far only wells of small production have been brought in in this area.

Sulphur deposits occur in the same connection, being found mingled with the gypsum and impregnating other beds adjacent to or lying between the oil-sands.

In the valley between the Rustler hills and the Delaware mountains there are also sulphur impregnations in the gypsum, but these have not been so thoroughly prospected as the beds east of the Rustler hills and the Toyah valley.

While the sulphur occurs in sufficient quantity to be commercially valuable, it is at present too far from market to make its development attractive in competition with the great deposits of the coast country of Louisiana and Texas.

The deposits of economic value occurring associated with rocks of the Cretaceous include quicksilver ores, coal, petroleum, salt, gypsum, and artesian water-beds.

The presence of cinnabar in the trans-Pecos region was known to the Indians, who used it in painting their faces and bodies, but all search for the place from which they obtained it was in vain for many years. In September, 1894, a large piece of the mineral which had been found in the southern part of Brewster county was given me and was presented before the Texas Academy of Science at Austin as the first find of mercury in Texas. In 1895 Professor Blake made an examination of the region, which had then been located for mining mercury, and his is the first published account of it. This was followed by the location of other prospects in the neighborhood, but, owing to the scarcity of fuel and the distance from transportation, development was rather slow for a time. Part of the trouble also grew out of the land conditions and the State Mining Law, as in the case of prospecting for gold and silver.

Several good mines, however, were opened and furnaces erected which have produced large amounts of quicksilver. At present only one of them is active.

The production is from the vicinity in which the ore was first discovered, but prospecting has shown several other localities where the mineral occurs apparently in commercial

quantities, and it is probable that a stronger demand for the metal and better transportation facilities will bring about a considerable increase in mining and smelting in this region.

This ore occurs in connection with rocks of the Cretaceous series which apparently were more or less faulted and shattered by movements accompanying the intrusion of the igneous rocks which we now find breaking through them at various places and interbedded with them as sills at others. In the crevices and openings thus formed the mercury was deposited and is found in several forms, the principal one of which is cinnabar. It is found in the Eagle Ford shales, Buda limestones, Del Rio clays, Washita and Edwards limestones, and, while the exact manner of its occurrence may vary somewhat with the different classes of material in these beds, the ore persists in depth as far as mining has yet been carried.

The coal deposits of the Cretaceous are found in connection with the Taylor marls occurring in the Big Bend of the Rio Grande and in the vicinity of Eagle Pass. Coal has also been found in the vicinity of the Eagle mountains and near Fort Hancock some thirty miles east of El Paso, but, so far as now determined, these latter are not of economic importance.

The coal occurring in the San Carlos field and southeastward in the Chisos mountain region, although it may not occur in sufficient bodies nor of good enough quality to warrant its being mined for shipment as fuel for general use, will certainly, when this region is opened up as it should be, become of very considerable local value as fuel supply for the quicksilver ores, for steam uses, and for the generation of electric power.

The deposits around Eagle Pass are of greater value. We have here a bed of coal which, with one or more part-

ings and a thickness in many places of six feet, underlies a territory probably fifty square miles in area on the Texas side of the Rio Grande and a far larger area in Mexico. It is somewhat ashy in places, but, on the whole, when it is properly mined and cleaned it is a very acceptable fuel for household and steaming purposes. It has been mined for many years in a small way, and in the future it will certainly form a cheap and desirable fuel supply.

The oil deposits of the Cretaceous occur at various horizons and are of great value.

In Burnet county the sandy limestone of the Paluxy is, in places, saturated with asphaltum derived in all probability from seepages from the underlying Bend shale. This occurrence and the wells drilled in the vicinity of South Bosque, each of which yields a few barrels of oil daily, suggest the possibility of similar occurrences of oil at other localities east of the Lampasas anticlinal when structural conditions are favorable.

In west Texas small quantities of asphaltum are found in connection with the Washita limestone, but, so far as is known, this series carries no workable oil deposits in this region.

The first oil found in the Cretaceous was in the Taylor marls at Corsicana and San Antonio, and the former has furnished a field for long-continued development and is still producing. It yields oil of two grades: one very heavy and asphaltic; the other, though also of asphaltic base, much lighter in gravity. The gas of the Mexia region is also found in the Taylor marls.

On the eastern line of the State, in Marion county, we find the western extension of the Caddo oil-field of Louisiana, which has produced such large amounts of oil. This oil

also occurs in the Taylor marls and Woodbine sands of the Cretaceous, and a proper study of structural conditions will probably result in the finding of other continuations of this field in other parts of eastern Texas. It is of a paraffin base and is of high gravity.

Still another occurrence of oil in the Cretaceous is found in the Cline asphalt-bed, where the highly fossiliferous limestone of the Anacacho is found strongly impregnated with a high-grade asphaltum.

The most productive beds are those connected with the limestone deposits, and the occurrence of the oil in these beds lends color to the theory that they were produced from the minute unicellular organisms of that time and deposited synchronously with the limestones with which they are now associated.

A very interesting occurrence, and at the same time one of very considerable commercial value, is that of the salt deposits associated with beds of the upper Cretaceous. These salines, as they are called, are found at various places in eastern Texas and Louisiana, generally as outliers from the main body of the formation, and surrounded, if not covered, by deposits of the Tertiary. Among the best known of them are Grand Saline in Van Zandt county, Brooks and Steen salines in Smith county, and the salines in Anderson county west of Palestine. The salt in these salines exists as deposits of pure rock-salt of dome shape. Borings at Grand Saline indicate a length of nearly a mile for the bed of salt, which has a thickness of over 200 feet. Similar salt-domes also occur in the Tertiary beds themselves in connection with the oil and sulphur. The way in which these accumulations were brought about is still a problem, but there is little doubt that they are all directly connected in some manner.

All of the salines named have produced salt at different times, and Grand Saline and Anderson saline have been steady producers for years.

While gypsum occurs in quantity in connection with the clays of the Cretaceous, it is usually in separated masses or individual crystals and fragments. In the Malone mountain, however, it occurs as a great body of gypsite and massive gypsum.

The gypsum in this locality seems to belong to two or three different horizons. The upper beds occur in connection with the Washita, while similar beds occur also in the series of rocks referred to the Glen Rose or Fredericksburg. This occurrence is without parallel in the Cretaceous of Texas, but a somewhat similar condition has been brought to light by recent oil-wells drilled on the Panuco river west of Tampico.

While the Cretaceous has added its full quota to our comfort and convenience by the materials of economic value preserved within its sediments, it has given us in addition a boon greater than all this in the belts of water-bearing sands which spread over so large a portion of the State, and which are not only the source of the beautiful creeks and rivers of central and southwestern Texas, but of innumerable artesian wells scattered over a far greater area.

The Trinity, Paluxy, and Woodbine sands are all to a greater or less extent water-bearing, and throughout a large portion of their productive area they yield water well adapted for all purposes.

To the east and south of the outcrop of these lower sands for a distance of 75 to 100 miles they yield a supply of water which flows from the wells in many places; and even when the surface has too great an elevation to permit this, as in the Edwards plateau, the water can easily be pumped to the

surface and thus made available where all other supply is lacking.

This in itself is ample warrant for a very close study of the geology of the region, since in many places they form the only lasting and sufficient supply obtainable.

The minerals of the Tertiary include iron ores, gypsum, salt, sulphur, tripoli, and fullers' earth, together with such other important substances as lignites, petroleum, and natural gas.

The iron ores of east Texas are wide-spread in their occurrence, their quality is excellent, and the aggregate amount available for mining and shipment is possibly greater than that of any of the other States of the Union outside the Lake region. These deposits are on or near the surface, and the areas underlain by them, which were carefully mapped by the State Geological Survey, aggregate nearly 1000 square miles.

These ores are all connected with or derived from the Marine stage of the Eocene Tertiary. This stage is markedly ferruginous throughout its entire extent. It still carries in places large amounts of greensand which represent those portions of the original amount deposited in the sands and clays of this period which have escaped the oxidation, solution, and redeposition through which the vastly greater portion of this glauconitic material has been transformed into iron ores, ferruginous conglomerate, and sandstones.

The ores are of two general forms, called from their structure the nodular and the laminated. The former occurs usually embedded in sands in the form of nodules or boulders from a few inches to one or two feet in length. The laminated ores occur in thin laminæ of dark brown or chestnut color, sometimes interstratified with similar laminæ of bright yellow.

The deposits vary greatly in thickness, the laminated ores being more regular in deposition than the nodular, but both *occur in workable quantities in many localities*. The ores are limonites, or brown iron ores, and the contents of metallic iron are frequently over 50 per cent.

These ores have been worked for many years. Prior to the Civil War small bloomaries existed where the ores were smelted and iron utensils were manufactured. During the war the number of these increased, but most of them were shut down at its close. Later more modern furnaces were erected at Rusk, Jefferson, and elsewhere; but on account of the high cost of fuel, and with the coming in of strong outside competition by reason of better transportation facilities, these were closed down one by one until not a single one remains.

The ores, however, are now in process of development, and if plans which have been outlined in the press are carried out they will be carried to the Coast, where cheap fuel will meet them, and will there be smelted and manufactured; or they may be shipped from the Coast by water to northern points where furnaces exist and cheap fuel is at hand, until such time as conditions warrant the building of furnaces in Texas.

The quantity of the ore is so vast and its quality so good that these deposits will in due time be of great commercial advantage to the State.

The brown coal or lignite deposits are principally confined to two of the divisions of the Tertiary. The lower, from the prevalence of these deposits, has been termed the Lignitic; the upper is the Yegua clays. Lignite is also found in the Fayette sands and in the Marine beds, but in thinner and usually less important deposits.

These brown coals do not occur in such continuous beds as we find in coals of the Carboniferous, but are usually in lenticular masses, some of which are of very considerable extent but nevertheless limited in comparison with older coal-beds. They were probably the results of deposition within local basins scattered over the Tertiary area, and with the shifting of these basins we find a corresponding change in the beds of brown coal. The beds have thicknesses of from a few inches to twenty feet, beds of six to twelve feet in thickness being not uncommon. Since the Tertiary belt stretches diagonally across the State from the Sabine to the Rio Grande and these brown coal-beds occur throughout its longitudinal extent, the total amount of coal available is very great. Owing to more favorable conditions of deposition, by far the greater amount of this coal lies east of the Colorado river, but the beds west of that stream are both numerous and of good thickness.

These brown coals carry a much larger percentage of moisture than do the older coals, and they have the quality of slacking when drying on exposure to the air. While this quality is a distinct disadvantage, they can be used satisfactorily as fuel.

Mines have been developed at various localities, and the annual production is now about equal to that of the Carboniferous coal.

During the progress of the State Geological Survey, extensive investigations were carried on in an effort to find ways of utilizing this abundant and cheap fuel supply. It was found that with proper arrangement of fire-boxes and draft it could be used advantageously in steam-making, both for steam-plants and locomotive fuel; and had not the discovery of oil given temporarily a cheaper and better fuel,

there is no doubt that the present development of the lignite deposits would have been much greater than it is. The use of oil as fuel has, however, only postponed the day of usefulness of the brown coal; for, with the exhaustion of the oil or its withdrawal from fuel uses, we shall be compelled to fall back on the lignite. The delay has really made for its better economic use, since it has made new methods available which add to its efficiency with corresponding decrease in cost.

It is probable that the near future will see it used both under stationary boilers and on locomotives as a powdered fuel sprayed into the fire-box in somewhat the same manner as oil is now sprayed. Its greater use, however, will be in the generation of electric power which will in time take the place of much that is done with steam. The adaptability of the lignites for this purpose has been fully proved by the government's experiments in the manufacture of producer gas from it. This producer gas, by means of gas-engines, can be made a source of electric power at a cost lower even than that of water-power plants. Since these deposits cross the entire State, electric-power plants located in the vicinity of the mines could use the coal as mined and transmit the power over its entire extent east of the Pecos at least. This, it seems to me, is our future hope for cheap fuel.

This discovery and development of the oil-pools of the Coastal strip have greatly aided the general development of the area in every way and added very materially to the wealth of the State.

The existence of indications of oil in the area was recognized half a century before the bringing in of the Spindletop gushers, and there was a small production in Nacogdoches county fifteen years before the Lucas well came in. This well, however, stimulated the search for oil in all likely

and many unlikely places and resulted in the discovery of many pools of greater or less extent and productivity.

All of this oil, so far as has been determined, occurs in the sands and shales of the Tertiary. Beginning with the Marine stage, we find that it furnishes the wells near Melrose, which have only a small production, and this is characteristic of all wells getting oil in these beds. While the Yegua has not as yet yielded any oil, it is the gas-bearing series of the Tertiary. Wells drilled into it in Washington and Fayette counties have given heavy flows of gas, as did the wells at Aguilares east of Laredo. There are doubtless many localities in the area underlain by these beds where gas-fields of economic value will be found when they are properly prospected.

The most of the oil that has been found in the Coastal area is in connection with the upper Tertiary. In a few wells fossils have been found that indicate the presence of deposits of Jackson age, but by far the greater number of wells in the gusher-fields strike their supply of oil in beds of the upper Miocene or Pliocene. This is true of Spindletop, Sour Lake, Saratoga, Batson, and Humble, and of the Louisiana fields as well. The oil-pools are of rather limited extent, usually less than 800 acres. They are each apparently located at the apex of a subterranean dome and are connected in some unexplained way with deposits of rock-salt, gypsum, and sulphur. The cause of this doming has not yet been determined; but as we learn more of the underground geology of the Coast country through the interpretation of the results obtained in drilling deep wells, we are more and more confronted with the fact that prior to the beginning of the era in which the Coast clays, which now present a surface so nearly level, were laid down, the preceding beds had been folded and eroded. Thus the floor on which the Coast clays

rest is very uneven, and it is highly probable that the formation of the domes was connected with the earth movements of the Pliocene.

The production of the oil-fields of the Coast has been enormous, and there is still a possibility, if not a strong probability, that other fields may yet be found in this region which will yield quantities of oil equal to many of those already exploited.

The mineral which occurs most abundantly in the Coast country is salt. It is preëminently the mineral of the domes and is usually found in them, whether oil and sulphur are present or absent. The beds vary in areal extent and are of such great thickness that no well has ever penetrated them far enough to find their lower limit. The rock-salt of these deposits is of very pure quality.

The prospecting for oil has brought to light many extensive deposits of rock-salt in our Coast country. The most important of these as known at present occur at Dayton, Pierce Junction, Blue Ridge, and Damon's Mound. There are many other localities, for similar beds, some of them of great extent, have been found in nearly every oil-field; but these are of special value by reason of their suitability for actual development and because of being uncontaminated by oil. Their areas have been fairly well defined by drilling, and wells have penetrated them to depths ranging from 200 to 2100 feet. It is estimated that these deposits alone would furnish more than one billion tons of salt.

In connection with the superficial deposits of the lower Rio Grande country we find the important salt lakes, the Sal Vieja and the Sal del Rey. The Sal del Rey, which has been the source of salt supply for the lower country and northeastern Mexico for many years, is some five miles in circumference and has a depth of only three or four feet.

The bottom of this lake is solid rock-salt, and the water a very concentrated brine.

Sulphur also occurs in variable quantity in connection with the oil and salt of the different Coast fields. In some places it is found simply as crystals disseminated through the sands, at others in more massive form mingled with gypsum or inclosed in cavernous limestone. It occurs in commercially valuable deposits at several localities, but the only one of these as yet developed in Texas is at Freeport on the Brazos river, where the sulphur is mined by a process of pumping superheated steam into it and melting the sulphur, which is then pumped to the surface and becomes solid on cooling. These deposits are most favorably located for development and will be a prominent factor in the world's supply of sulphur for many years.

While gypsum occurs in the various Coastal fields in connection with the oil, it is not often in such form as makes it available for mining.

There are, however, in southwestern Texas deposits of pure gypsum which are of economic importance. The principal of these is the Loma Blanca, a few miles east of Falfurrias. This hill, which is 75 to 100 feet high, is composed of pure gypsum, and its crest shows an exposure of clear, transparent selenite which covers several acres and has been proved by drilling to have a thickness of 1000 feet.

This occurrence is not the only one in the region, and the relation of these mounds to the Sal del Rey and other salt deposits lying at no great distance south of it is a most interesting problem.

Throughout the Coastal plain from the Sabine to the Rio Grande there exists in connection with the sandy layers of the upper Tertiary a supply of artesian water that is secondary only to that contained in the sands of the Cretaceous.

It furnishes the water supply for nearly all the Coastal cities, including Houston and Galveston, and yields great quantities of water for aid in irrigation and for farm and ranch supply.

The sands of the Eocene also furnish large supplies of water, and it is probable that the entire producing area of the Tertiary will equal that of the Cretaceous. Like the Cretaceous, some of the water obtained from the Tertiary is more or less mineralized, but the amount of pure water yielded by it is of immeasurable benefit.

Time forbids more than this hasty sketch of the various minerals and materials of economic importance which are found within the State, and many occurrences of local value cannot even be touched on. It is hoped, however, that what has been said of the geologic growth of our territory in its broader relations and individual conditions, of the great variety and wide-spread occurrence of mineral and other substances of economic value, and the evidence we have of the intimate relation of all these materials to this growth, will bring out the full force of the necessity for an accurate knowledge of the geology of the State as a basis for the work of the discovery and development of these resources as well as for the cultural results which grow out of the study of the subject.

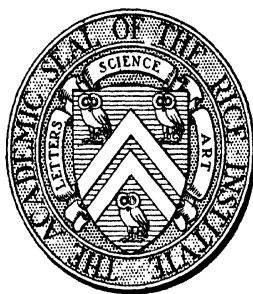
EDWIN THEODORE DUMBLE.

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LIFE BY LOVE¹

"Through Law I became dead to Law in order that I might live to God. I have been crucified with Christ; nevertheless I live. Yet it is no longer I that live; it is Christ who lives in me." *Galatians xi, 20* (*Twentieth Century New Testament*).

TO such height of utterance does the apostle rise in stating his thought of himself and his life. It is essentially and distinctively the Christian thought of life. As such I would consider it with you this morning as simply as may be.

Christianity, in any adequate conception of it,—and indeed all true religion,—is at once both a life and a love, a life which beginning in righteousness is fulfilled in love; it is a life of love. As a life its way is the way of all life, viz., dying to live; life anew and higher and more abundant and complete through death to life old and lower and limited and fragmentary. And as a love its way is the one way of love, viz., losing self in another self and in the losing finding a truer and nobler self.

"Among those who were going up for worship at the festival were some Greeks. They went to Philip, of Bethsaida in Galilee, and said: 'Sir, we wish to see Jesus!' Philip went and told Andrew; and then together they went and told Jesus. This was his reply:

" 'In truth I tell you, unless a grain of wheat falls into the ground and dies, it remains solitary; but if it dies it becomes

¹ Baccalaureate sermon of the first commencement exercises of the Rice Institute, preached by Peter Gray Sears, Rector of Christ Church, Houston, Texas, in the academic court at 9:30 o'clock Sunday morning, July 11, 1916.

fruitful. He who loves his life loses it; while he who hates his life in the present world shall preserve it for Immortal Life!

“ ‘If any man wishes to walk in my steps, let him renounce self, and take up his cross daily, and follow me. For whoever wishes to save his life will lose it, and whoever, for my sake, loses his life shall find it!’ ”

Dying to live! Life through death! So all life proceeds uniformly. The process is that of a constant unveiling of life beneath life, the uncovering of ever-deepening mysteries of existence. The child sees and knows life only in outward objects, in concrete material things. He perceives only the life of form, outline, size, color. To him life consists in the beautiful color of the flower, the gay hue of the butterfly, the splendor of nature's robe; it is made up of concrete things and the sensible qualities of things. But after a while knowledge comes, as we say, and reveals a deeper life beneath these outward concrete forms. Then color, shape, size, foliage, become but expressions of a law and order which rules the universe. The child becomes alive to the deeper laws of created things. It is the same with the child's outlook upon the world of human life. His first thought of human greatness and glory is with the external trappings and coverings and manifestations of greatness. The gorgeous uniform and glittering decorations of place and office are the things which he delights in. But as time moves on growing knowledge unfolds to him the meaning of these outward things; and he comes to see and understand that they are but the outward tokens and expressions of a life of social and political order in which one day he must take his place and part. The life of duty is gradually disclosed to his view; and he comes to realize that he is no longer to play

with the colors of life but to help work out its true harmony by doing his work and duty where he is.

The result of this gradual unfolding of the deeper life is always the gradual displacement and ultimate destruction and death of the earlier view of life.

“When I was a child I thought as a child, I understood as a child, I talked as a child; but when I became a man I put away childish things.”

The realization of the deeper and truer life makes us heedless of the other and earlier. In “pressing forward to the things which are before” we “forget the things which are behind.” The soldier thinks but little of the brass buttons and the uniform which were once his childish delight now that the real and serious work of his calling is before him. Discipline, drill, endurance, courage, are the elements of his new life of duty; these are his attractions now; and he is dead to the things which once absorbed his thought. The woman loses her delight in the bride’s orange-blossoms of yesterday in the deeper and richer delight of her motherhood and sweet home toil of to-day; her wedded life has unfolded to her new duties and privileges; in these she lives now; she is become dead to many things which once attracted and charmed her, yet she lives anew in the happy cares and welcome burdens of the wife and mother in her home. It is so that as life unfolds to us her deeper veins we die to the earlier childish joys.

That, I think; is something at least of the meaning of St. Paul’s experience of which he wrote. The old life had once been to him a great satisfaction and gladness. He had been proud of the blue blood of the aristocratic tribe of Benjamin to which he belonged, of the high moral integrity of the sect

of the Pharisees, of the distinguished and honorable place he held in the Sanhedrim. But, when the dawn of a deeper, richer, nobler life broke on him, he died to the attractions which fascinated him before. When he came to see and know human life as Jesus Christ of Nazareth revealed it,—the life of helping to lighten the heavy burdens and soften the sorrows which ignorance and wilful folly bring upon men, of lifting up and elevating the characters of men, of teaching the downcast and despondent to know the unwearying and unending love of God, their Father, for them,—then those things which he once reckoned as gain became but dross to him. The deeper life of the spirit was uncovered to him; and he saw that the best and truest human life does not consist in pride and self-conceit and isolation, in the low selfish satisfaction of past privilege or present honors; but in growing daily more like to God by going forth among men with the thought and purpose of being helpful, not to man, but to men, to any man and every man, and to every woman and every little child, always in meekness and lowliness of heart, charged with the splendid enterprise of setting forward always and everywhere, in things great and in things small, fairness and justice and righteousness and brotherly love among men and women and children of all sorts and conditions, those that are far off as well as those that are nigh. This was his life now; and he was dead to the old. With Christ he had been crucified, put to death, to the old; nevertheless he lived,—lived as indeed he had never lived before.

AND here we must note the fact how that in this new life St. Paul was to find, and did find, as all others before had found, even as his Friend and Master, Jesus of Nazareth, had found, that the higher the life the more bitter the pain,

the loftier the duty the more perilous the performance. The old life had no cross in it such as the new brought to him. In following after the higher he met perils hitherto unknown, —“perils of robbers, perils of waters, perils of heathen, perils of false brethren.” It was even so. It is ever so. No man may ever step out of the life of lower satisfactions and delights, of earthly comfort and ease, without encountering both peril and pain. Suspicion and distrust, misunderstanding and misrepresentation, carping criticism and contemptuous sneer, envy and hatred, danger and suffering, wait ever upon the steps of all high-purposed life. Nevertheless, such life only is true life. Whatever the hardship and suffering, it is nobler than the idle, easy, flower-sown life of self-indulgence that is left behind; and once embarked upon, the very sharpest and bitterest pangs would never cause the soul of any true man or woman to turn back. Like the sailor tossed upon the stormy deep, he would not change the dangers of the giant waves and the creaking timbers for the safe shore fringed by a smiling sea. This, now, is his life; and he lives more truly in danger and duty than in safety and delight. Even so it was with St. Paul. Though the cross was a real cross, heavy and hard to bear, yet the old uncrossed life had no longer any attraction for him.

“I have been crucified with Christ [he said], nevertheless I live! I have found my life’s largest and best work; and to that I go at whatever cost! Forgetting those things which are behind, and reaching forth to those things which are before, I press forward to the goal, to the prize of the high calling of God in Christ Jesus, if I may only apprehend that for which I am apprehended! As compared with this, nothing else in life is worth while!”

So it was that with confident trust in the love and care of God, knowing that His fatherly hand was ever over him to guard and protect him, he was strong in a strength not his own to face all dangers and difficulties, even to the death of the block and sword on the Appian Way. The old dream-life of self was gone. The new, real, strong life of helpful service and sacrifice was his. And in realizing it, in living to work like God and so to grow like God, he found the one only real, true human life in all its fullness, even eternal life, the very life of God reproduced in a man.

SUCH, then, is human life as in Christian thought contained and in the great apostle to the Gentiles exemplified. How shall men and women rise up into it and walk along its lofty levels? Not merely the discovery, the vision, the knowledge of such life will send us forth into it. Human nature is still such that while we see and approve the good, we yet follow the evil. With clear vision of the higher and better, men and women yet give themselves to the lower and worse. And by some dreadful twist or defect—shall we say, of nature?—we, all of us, are too largely content to have it so. There must be some deeper and stronger motive than vision or knowledge to impel us. Is there such motive? Is there such power available? There is. It is to be found in that which the great Scotch preacher, Chalmers, called "*the explosive power of a new affection*,"—the power of love to drive out the old and bring in the new. Just that is the meaning of the second part of St. Paul's words: "I live; no, not I, but Christ liveth in me!" "It is no longer I that live; it is Christ who lives in me."

That is the paradox of love, a self which is yet not a self, a self merged in another, an exchanged personality; a life surrendered and laid down and given up to another for the

other's guidance and direction and keeping,—a life lost in another and in the losing found again in nobler fullness.

With that experience, the experience of exchanged personality, true human life always begins. And not only human life, but life of whatever sort; for no living thing in all this world from bottom to top ever finds its true life until it has first lost its life in another.

“I hold it true, whate'er befall;
I feel it when I sorrow most:
'Tis better to have loved and lost
Than never to have loved at all.”

So sang Tennyson with a depth of poetic insight reaching to the very “heart of things as they are.” And we, every one of us, feel and know the truth of his word, though it may have to be even in bitterest heart-ache. And our acceptance of that truth is but acknowledgment that our own human life at least would have missed its fullness if it had never gone forth and lost itself in another.

Losing life, and in the losing finding richer and truer life! Nature herself teaches us that in a thousand illustrations. The waters of the sea teem with minute fugitive life which only begins to put forth strength when it has taken hold of the rock and knit itself to it. The seed begins its own real life only when it has lost itself in the bosom of the earth. The insects building up the reef on the island, the worms giving new vigor to the soil, tell the same story, the story of life found only when and after it has been lost, of the power of existence breaking forth into strength and beauty from life given up into the keeping of another.

That is the secret of power—the only abiding power it has—in a nation's life. The statesman finds his might and

strength only in a life given up to and absorbed in his country's life. "I live; no, not I, but my country lives in me," might well be his language. Patriotism is a power; yes, but only when patriotism really means the heart of the nation beating in the heart of the individual, and the individual identifying himself absolutely with his country's well-doing and well-being, dying to self and every interest of self, that he may live for and in the highest and best life of his country.

Even more clearly is this truth seen in the experience of the human heart, the deepest of all our experience.

"At the first sight
They have changed eyes!"

So Shakespeare describes the dawning love of Ferdinand and Miranda. It is the life of self absorbed in another. The love of wedded life is just that exchange of personality which finds its expression in the mutual cry: "Not I, but she! Not I, but he!" And the moving years of united lives only serve to deepen the truth. All work outside in the great busy world is no longer for himself when the worker has a home. And all home work to the wife is wrought in the thought of the bread-winner. This love brightens all interest with new light; and the older and earlier joys are trifling and nothing now as compared with the new and richer joys of that life which is one, yet two; which is the life of neither, but of both; which can no longer be the life of self, but of the other. And the years pass again, and reveal the truth at even deeper depth. The mother's life is lost in the life of her child; and she can say,—every true mother does say,—"I no longer live; but my child's life is the life I am living!" And that is the very glory of motherhood. And the years pass still again, and the children come to learn

the same truth. Growing knowledge and experience teach them the meaning of the father's and the mother's life. They begin to understand somewhat the toil, the peril, the pain, the sacrifice, which surround their parents' life; the bond of a common sympathy and a common interest is created; they live in the parents' life; they feel with their feeling; they are moved by their danger;—and all because they are absorbed in the love of them. The sweet and blessed bonds of love bind them into that union which has no other voice than the "Not I; but father, mother, sister, brother, the family!"

It is so that in the one best and strongest thing of all we know in this world, viz., the oneness, the unity, and solidarity of the home life, we have entirely clear illustration of the truth of St. Paul's saying: "It is no longer I that live; it is Christ who lives in me; for the love of Christ constrains me!"

THIS principle of exchanged personality lies at the root of all the forms and ministries of human life. It has ever been and is the moving force in all true religion,—*i.e.*, in life related to God, to God however conceived, at whatever stage and in whatever form revealed and thereby known. From the beginning clear through to the end the one first and great commandment of all true religion is this: "Thou shalt love the Lord thy God with all thy heart and with all thy mind and with all thy soul, with all thy strength";—absolute devotion of self to God; the unconditional surrender of the inmost citadel of personality:

"Our wills are ours, we know not how;
Our wills are ours to make them Thine!"

It was just such surrender, such abandonment and loss of self, such giving away of life into the keeping of another,

such love, as we call it, that made possible the lifting up and ennobling of the man Moses from a common cowherd to one of the greatest and noblest leaders of men and witnesses for God and righteousness of whom this world has record. His strength,—so he himself declared,—his wisdom, his very life, were not his own. From the day when he first met Jehovah at the Burning Bush until the day when he went up to that solemn mount where he met Him once again, never to return alive,—when he was left “on Nebo’s lonely heights,”—his one word was: “*I cannot go unless Thy Presence go with me!*” It was the love of God that constrained him. He lived and moved and wrought and had his very being in God. Again, in the later and larger development of the religious life of the children of Israel, its basic thought finds noble utterance in the Psalmist’s song:

“Like as the hart panteth for the water-brooks, so longeth
my soul after Thee, O God!

My soul is athirst for God; yea, even for the Living God;
my flesh also longeth after Thee in a barren and dry
land where no water is.

I will love Thee, O Lord, my Strength, my Saviour, my God,
and my Might; in Thee will I trust!”

That—nothing less than that—was the moving force in the religious life of God’s people of old. They had “a passion for God.” And it wrought out in them a religion of righteousness so righteous, built upon foundations so deep and so broad, that it has stood through all the centuries, and still stands. It has put all the generations of men under obligation to them for such moral and spiritual leadership that even to this very day we go back to their laws for the fundamental principles of social righteousness and back to their prophets for the fundamental principles of divine life.

THIS, again, was the secret of John Baptist's zeal. He was content to lose himself in Him to whom he came to bear witness. His joy was fulfilled in the glowing glory of Christ, even though his own star sank out of sight. "He must increase; I must decrease," was his language. It was but the anticipation of St. Paul's utterance: "I live; yet not I, but Christ liveth in me."

AND, as of all the lesser ministries, so is it true of that one highest and divinest ministry this world has ever seen,—the life and ministry of Him who, though alive in the glory of His Father, yet, compelled by the almighty power of divine love, humbled Himself and became dead to His own glory that He might live for and in men for their gain. He came and took our human nature that He might see the world with our human eyes, meet and contend with our human trials and temptations, and share with us our human life's sorrows and griefs. He became one of us. He identified Himself with us. He lost Himself in us in His great love wherewith He loved us, that so He might lift us up to see all life with His eyes of divine love and tenderness, that no longer the spirit of self should rule in us, but that His spirit of love and self-surrender should dwell in us and send us forth into life even as He Himself went forth to bring men into the kingdom of love, which is the kingdom of God, for God is love and nothing else.

Religion? Life related to God? There it is; lived in its fullness openly in the sight of men; and uncovering to us the very heart of God, so that in its terms only do we now think of God and know God. And its one and only sign is the sign of the Cross, the symbol of self-denial, of self-renunciation, of self-sacrifice, of "love to the end," of loss of self in an-

other, of death of self and through that death a new birth unto both man and God!

BUT, some man will say: "How can these things be? The preacher speaks to us in the high and difficult language of a far-away and impracticable idealism!"

In what other language could he to-day fitly speak? In the low and easy language of a grovelling utilitarianism? He thinks not so.

My brother-men, listen to me! In days not long gone even their harshest critics could not but recognize in the American people an idealism at times sublime; and great was their praise among the people of all the earth because of it. Are there not those—and not a few—among us yet who would above all else rise up in thought and purpose and aspiration and effort into the lofty realms of idealism? Surely, surely, we have not become altogether a people "of the earth earthy."

God have mercy upon America—well may that be our prayer—when her preachers can ever speak in aught else than the language of idealism to the young men and young women of her universities and colleges!

For one at least, young men and young women of this first graduating class of the Rice Institute, coming at this solemn hour, when we have gathered together in the Name and Presence of God, called to speak to you as one who would speak for God, the only word I would speak—and the only word I know you yourselves would have me speak—is the one highest word possible. Judge ye, therefore, what I say:

"I know a bush that fire cannot destroy;

I know an altar that unbinds the hand;

I know a sacrifice whose root is joy;

I know a flower that heat does but expand.

Love is that altar; in its cleansing fires

 The tree of life grows green with youth again,
And in the rapture which its flame inspires

 The captive heart forgets its former pain.

Put on my fetters, and thou shalt be free;

 Embrace my altar, and thy cords shall fall;
Become Christ's captive, and thy soul shall be
 Lord of itself and master over all!"

Young men and women, follow after Him; give yourself to Him in complete abandonment of love and devotion; and in the splendid fullness of His humanity you will find your highest and best life.

PETER GRAY SEARS.

IS WAR ETERNAL?¹

Gentlemen of the Rice Institute, Ladies and Gentlemen:

IT is to me a very great pleasure and a very real pleasure to be with you to-day.

It is only a little while ago that a young man, who had been appointed president of an institution that did not then exist, came to me to talk over the situation. He had ideals, —ideals that could be worked into action, ideals of genuine realities in education, the ideal that quality was a more important thing than numbers, and the ideal that friendliness was a component quality of good teaching. I was very much interested in what he was doing.

There is a fine spirit growing up in all our universities. We are all glad to see the work done as it ought to be. I can remember when I was in Cornell as a pioneer freshman in 1868, when James Russell Lowell and Professor Agassiz came over from Harvard and a member of the Harvard Board of Overseers told those distinguished men that they were traitors to Harvard because they went out to lecture in a rival institution. Those trustees are all dead, and all their kind are exterminated from the face of the earth. We all realize that everything that goes to make the business of education respectable is something we can encourage under all circumstances.

Now, this institution has many of the same ideals that Stanford had: the ideal of being good-looking to the eye,—

¹ Address delivered by David Starr Jordan, Chancellor of Stanford University, at the first commencement convocation of the Rice Institute, held Monday morning, June 12, 1916, at 9 o'clock.

there are here a great many beautiful buildings,—and the ideal as to the kind of faculty it should have is shown by simply taking from Stanford one of the best of its men to become a professor of the faculty here. That is what we call a practical compliment and appreciation; and if we ever get rich enough at Stanford we may return the compliment in a practical way. But I have nothing to do with it any more. I am simply the wandering, talking man, Chancellor Emeritus, one who started in twenty-five years ago and got through alive, which is a great thing for a university president. To do this requires many of the qualities the president of the Rice Institute has.

Now comes my talk, and what I want to say is summed up in these words:

Every great evil dies in the moment of its highest triumph. When a great evil is triumphant, then it is bound to die, because men see it nakedly for what it is; and when an evil gets itself big enough for men to see it nakedly, then it is doomed. The greatest evil in the world is that of International War. We got rid of two of the worst of crimes some three hundred years ago. One of these was the baronial war, when every duke and lord and nobleman had his own private army, his private dungeon, and his private graveyard. This was in the days of chivalry. If you want to know the real truth about chivalry, don't go to a moving picture show, don't go to the romantic novels. Go to the criminal records of the day when criminals ruled the world. History is largely the record of a slow upward movement, the rise of the common man and the progress of democracy.

The prophets of the world are not the foretellers of coming events, but of coming inspirations. They can see to-day what all men must see to-morrow—the cheapness of glory, the crime of injustice. In advance of their time they feel the

reaction inherent in human nature when men come to understand.

There are two current arguments used to uphold the war system. The first of these is that war is the source of national virility, of national power. The other is that war is eternal.

The idea that war makes for individual virility confuses bluster with power. In all times war-making has assumed the name of patriotism. Its reckless overriding of common welfare has been called strength, while the concentration of all effort on victory tends to confuse all moral values. Victory at any price is one of the chief obstacles in the path of human freedom.

Whatever the primal nature of war, its every act is murder or robbery. Its temporary effect is moral degradation and the lowering of national aims. Its permanent effect is the lowering of manhood, the extirpation of the high-spirited, the brave, and the strong, the very elements of the nation which bring success in war or in peace. It is a law of biology that like produces like among men as among animals. "Like the seed is the harvest." Each generation is the reproduction of those who were its actual parents. In the business of gathering armies, those young men who are hardy, strong, and hearty, without blemish so far as may be, are sent to the front. On the field of slaughter these are taken first. Lord Kitchener once said that in any war the first two hundred killed on either side are the best. "Send forth the best ye breed," has been the immemorial call of war. The nations which respond breed from the second best. It is a Spanish proverb: "Lions breed lions; a brave man has brave sons."

I was in London when the war began. I saw the men from Oxford and Cambridge, fine upstanding fellows, every

athlete included, and men of wisdom and power, men like Ronald Poulton and Rupert Brooke, who fell before the slaughter was half begun. I saw the men from the other universities, the "picked half-million," as my friend Stead used to call them; "those who command while the world must obey." I saw the university men of Scotland, still more vigorous, on the whole, coming down to be trained at Aldershot; "the unreturning brave of the Aisne and the Yser." Around these as they marched in the London parks, lying on the grass and smoking cigarettes, lay the young men of London whom the war could not use. There may have been a hundred thousand of them—undersized for the most part, but that is nothing. A little man is just as good as a big one if he is as well put together. He may be a better soldier: he is not hit so often. But these men of the discard were badly put together; loose-jointed, knock-kneed, suffering from adenoids and pyorrhœa, saturated with gin and shot through with vice, the army had no use for them. "You cannot go to France or Flanders," said Lloyd George. "You are useless to your country under a strain. You stay here in London and become the fathers of the next generation, even as your fathers and grandfathers, who, kept out of the wars in India, in Burma and South Africa, stayed here and built up the London slums." The slums of the great cities of Europe are built up by those war could not use. They slide down the lines of least resistance into the great hopper they have themselves built, and at last there remains a slum population of men who could not earn their living in any part of the world. The best are lost in war, and the sons of the feeble-minded weakly take their place. This is a Moorish proverb: "Father a weed, mother a weed, do you expect the daughter to be a saffron-root?" Father of the slums, mother of the slums, do you expect the son to be a British yeoman? This

is the long cost of war—the last cost, the sacrifice in greater or less degree of those whose life creates the nation, and the loss of the long widening wedge of those who should have been their descendants. The destruction of the strong is the primal function of war, and in the long run only those nations survive which have had least of it. The downfall of empire through the ages means the progressive destruction of those whose energy made empire possible. The present war must show its effects for a century, in the physical decline, and more or less in the mental and moral decline, of the great nations of Europe. The idea that any permanent physical, moral or spiritual values are inherent in war is one of the exploded notions of a world's childhood. The imperative word of science is: "Like the seed is the harvest."

The other argument for war reads like this: "There has always been war; human nature demands it; human nature does not change; war, then, will always be."

It is not true that human nature does not change. It changes very slowly, for better or for worse. Vice and idleness destroy the least efficient; war and industrial negligence tend to destroy the best; and like the seed is the harvest.

But the angle at which human nature looks in human institutions may change, and change very suddenly. Nations may undergo a process of conversion to good or to evil, even as an individual. A great wrong dies in the moment of its highest triumph. When men come to see it nakedly, even as the prophets have seen it, that wrong must pass away. And the greatest of all wrongs is that embodied in collective murder, the idea that crime becomes a virtue if compassed on a large scale with the sanction of the state and the blessing of the state church.

Just for a moment we may glance into history, touching a few points here and there. Let us go back first to the begin-

nings of Europe, when our race ran wild in the forests of Germany. But that is not far back. We are very near the beginning now. In history's long perspective, these days of Napoleon and Kitchener, of Bismarck and Beaconsfield, will take their place alongside those of Cæsar and Moses and Homer, of Trismegistus and Ozymandias, the dark ages of war. What better evidence do we need than that found in the common suicide which civilized Europe has inflicted on itself? We are still in the dark ages, when neither science nor religion can hold its own against war.

Human nature changes very slowly, and only backward or forward by the process of selection, the killing of the best or the worst. Any education enables the better ones to outlive the others and to increase in numbers; even though their number of children be smaller, their number of children that live and amount to something is much greater. The manifestations of human nature change rapidly through education. The angle of vision changes very quickly. The angle at which we look at a great crime may change with a sudden flash.

We are going to see the phenomena of nationalism very differently in a short time. We shall be ashamed of that fever of so-called patriotism, that excited stimulation which forces a man blindly to hate another nation and to brand its citizens as inferior and wicked. Europe has been perverted by this patriotism of lies. To escape from it demands no change in human nature. It is a matter of education. Perverted education causes perverted nationalism, which shows itself in a perverted patriotism. This has made it possible for a very few men to drag Europe into a war that is, in a way, wrecking the whole civilization of Europe.

Long ago, after a great battle in which our ancestors, the In-Group, were victorious over some forgotten Out-Group,

the feast of rejoicing took place. The wise men of the In-Group ate the brains of the Out-Group sages to acquire their wisdom. The young men of the In-Group ate the hearts of the Out-Group heroes, that their courage might pass over to them. And the half-starved common folk, our ancestors,—yours and mine,—ate their fill from the accumulated mass of human bodies.

But some one rose and said: "All this is wrong. It is a degradation of the efforts of the gods, whose noblest work is man. How do you know that eating brains gives wisdom or eating hearts gives courage? That is tradition, to be sure; men have always believed it, as they have believed many other things. But that does not make it true. And even if it be true, that is not the right way to gain wisdom or courage. It is all wrong, and it will bring its punishment."

There they took up the old argument. There had always been battle feasts. It is a demand of human nature, and human nature never changes. There would be no reason for war if the feasts were given up. And in peace men would grow soft and gentle, wisdom and courage would decay. You cannot fight unless you mean to kill.

So they disposed of him very readily. He was only one man. Prophets are the softest things possible when you go at them with rack and sword. But his words sank deep, and if we can believe the flimsiest of traditions, the greatest of cannibal feasts was the last. This we know, that the feast had passed away before our ancestors were able to make any history.

Running through history, touching it at the highest places for the moment, human sacrifices to one or more gods were current among the civilized world. They were practised among men as wise and experienced as you or I. Prophets

spoke against them, but some prophets recognized them as infallible, that the only way to propitiate gods is to give up what we have to them. So kings gave up their eldest sons, their sweethearts, and their eldest daughters. They were offered as burnt-offerings. They saw it nakedly for what it was, that if the gods were good they would be propitiated in that way. Then they put in kids and lambs and cows for the same purpose. Then some spoke up against that, saying that the god of the spring loves the "grass-green meadows, the grazing kine's sweet breath," and not these bloody sacrifices and these gifts that smell of death. And so in one nation after the other that sort of thing was put away.

Human nature does not change, but the angle at which men see things changes, and changes very rapidly. It is possible for the civilized world to undergo something like what is called conversion and sudden change of outlook upon life. Physiologists tell us, some psychologists tell us, some such change comes at the age of thirteen to fifteen years, a time when the world looks suddenly different to the young man or the young woman, when they begin to see things in broad outline in a large way; and some such conversion comes when a young man goes to college, or the young woman; or when they go out of college, and all along as they receive additional intellectual or spiritual impulses. The world looks different to them. They see things at a different angle from what they saw them before.

Almost two thousand years ago, among the dry hills of Syria, there arose a young Man who spake as never man spake, of human freedom, and divine love, and of brotherhood among men. The record of His words is far from complete. Those who had never heard Him recorded His sayings in a tongue not His own. But there was something in His words which compelled the attention of the world.

God is the Father of all men, and all men are brothers. Each has the right and the duty to make the most of himself. Each has the right to speak in prayer to his Father, and this he can do in his own closet or on his own mountain, or wherever it may be, with no intervention of a holy priest or a holy city. There were many other things which He said, but it was all permeated with the idea of the holy freedom of the human soul, and the feeling of brotherly love and the coöperation of the kindly-affectioned.

But the conception of the day of democracy and peace His words foreshadowed dazed the time-servers of his day. It is recorded that

“Those whom the Light did blind rose angrily,
And nailed His body to the cruel tree;
But He resented not, nor bid them nay,
Because that He had seen God face to face.”

He was but one Man among thousands, and they disposed of Him very easily. But some part of His words has fallen into the heart of every one of us. We see the affairs of life at a different angle. And this is true in some degree of every man and woman who lives on earth to-day.

But the selfishness of men obscured even His teachings. The priest was still at outs with the prophets, and the right of private interpretation was dangerous to the institutions men had built up in His name. So it became necessary for the sake of the church to extirpate the heresies which had sprung up around it. On the green in front of one of the colleges at Oxford they built two great pyres of pine-wood around the bodies of Latimer and Ridley, two British scholars who had put their own meaning into the Master's words.

Then Latimer said to Ridley: “Be of good cheer, Master Ridley, for we shall kindle a torch which shall be seen of all

England." And the flame was lighted, and all England saw nakedly what religious persecution meant. And the actual flames of intolerance were never kindled again. These prophets were disposed of very easily, but their death caused men to see the wickedness of their undoing.

Some three hundred years ago, and more, Central Europe was in the direst possible confusion. While the feudal system was in vogue every prince, every lord, every free city had its own army. Every baron had his own dungeon tower, his own graveyard, his own system of seizing his rivals and holding them for ransom. The common people were not citizens, but chattels, owned body and soul by the feudal lords and spiritual masters. Everywhere Catholic was armed against Protestant, and Protestant against Catholic; while wandering bandits, who knew neither religion nor nationality, were to be hired for murder and rapine of every degree. To have any respect for the spirit of the days of chivalry one must seek it in romance, never in historical fact.

In these days, when the civilization of Europe was at its lowest ebb, in a land in which every man, woman, and child was under sentence of death from the King of Spain, arose Hugo Grotius, one of the noblest of the long line of prophets, a link in the long chain that shall never come to its end. Much of the life of Grotius was spent in prison, and he never knew a year of even approximate peace. But no work of any man has come in modern times nearer to that of the Founder of our religion than that of Hugo Grotius.

The Thirty Years' War of religion in Germany reduced the population of that region from about twenty millions to six millions. And at last, when the delegates came together at Münster for the Treaty of Westphalia, sick and tired of war, they resolved that religious wars, baronial wars, and all that type of murderous discord should never again be

revived; and it never has appeared since that time. Human nature has not changed. It retains its weakness, its intolerance, its obedience to the swashbuckler, its sham patriotism based on hate; but warfare in the name of religion has passed away. Men see it at a different angle, because they see it nakedly. Nations have been built up through the disarming of their feudal units. And just as surely as feudalism has melted into nationalism or partial federation, just so surely must nationalism give way to federation, complete enough to leave no place for war.

I might go on in history touching high places. We have come to see the institution of slavery from a different angle from what we used to see it. There was a time, something over fifty years ago, when human slavery reached its climax in the esteem of the world. There came a tall, gaunt, shaggy-haired, bloody-handed man out from the West and placed himself squarely in the road, saying either slavery or he must perish. We cannot say that John Brown's record on the red fields of Kansas had been wholly a noble one. It is plain enough that he violated the law and forfeited his life; but the fact remains, he stood squarely in front of a slave-chasing nation and demanded reconsideration of our attitude. Even in the North in those days there were religious leaders who maintained that the negro was an inferior type of man; that, being so, he should take a lower place; he should do our work for us and be thankful for the chance.

You will remember that in the little town of Harper's Ferry, where the Shenandoah runs into the Potomac, to John Brown, who was shot and lay wounded in an old engine-house, men came up and said, "Who sent you here?" From that moment John Brown became a prophet. His noblest side came to the surface. "Nobody sent me here; I obey only my own promptings and those of my Master; I acknowledge no

master in any human form; I am come to try to save those whom you wickedly and wantonly hold in bondage, men and women that are just as good as you are, and just as precious in the sight of the Lord. I have never heard that God is a respecter of persons. You may dispose of me very easily, --I am almost disposed of already,—but this slavery question will not be disposed of until it is settled right.” They disposed of him. They took him on to the hill at Charleston and tried him for treason. He was guilty enough. Bloody-handed, he was taken in the act. The Governor of Virginia said he was the gamest man he ever saw. But he was not thinking of his enemies when the governor thought he looked so brave. And so they hung him, and they sent his body to his home at North Alba in the Adirondacks, and his friends put upon his grave a huge granite boulder, carving in letters that you can see miles away: “John Brown.” Under this stone his body still lies mouldering, but there was part of him not under the jurisdiction of Virginia, a part they could never hang or bury, and to the infinite surprise of the Governor of Virginia his soul went marching on.

Slavery did not die because the North won in the war; military force can never destroy that which is right in itself. Slavery died because the South saw a greater future freed from this incubus. Secession was not killed by force of arms, but by moral force, starting with General Robert E. Lee in his noble speech to his men at Appomattox Court-house. He appealed to them to be henceforth good citizens of the United States; and the patriotic men of the South came to realize that this our continent could not be split in two by rival warlike factions.

This human slavery vanished in the hour of its triumph. The world has seen it at a different angle, and the movement of civilization can never permanently go backward. I

might tell you of the prophets of freedom and good will, who have given a new intelligence to the world.

But the world over, the story runs much the same. The old wrong dies in its triumph. The world rises to a higher level of morals and of intelligence. The prophet beholds the dawn a little in advance of the others; but sooner or later the light comes to the great body of men.

And so it will be with the most awful and ruinous of crimes and blunders—war between nations. It may be that this is not the last war. It may be that civilization must pass through a more terrible ordeal before the rule of force and terror shall have passed away.

It may be that kings and empires, privilege and exploitation, warriors and weapons, dreadnoughts, submarines, and Zeppelins, must all pass away in one grand horror. But the end must come. God is not mocked forever; neither is man.

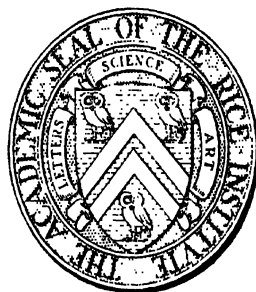
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A university of liberal and technical learning
founded by William Marsh Rice in the City of
Houston, Texas, and dedicated by him to
the advancement of Letters, Science, and Art



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ADDRESSES OF WELCOME AND RESPONSES AT A
LUNCHEON GIVEN AT THE CITY AUDITORIUM
BY THE MUNICIPAL GOVERNMENT OF THE CITY
OF HOUSTON

MAYOR RICE: *Ladies and Gentlemen*—This day marks an epoch in the history of our city. As head of the municipal government I have the pleasant privilege of extending a hearty welcome to our guests by whose presence the day is made historic. We are profoundly grateful to the distinguished gentlemen who have come across the seas to do honor to our city and State on this occasion. Equally grateful are we to the many citizens of our great republic and to our fellow-citizens of Texas who are assembled here in the name of civilization.

Though Houston is a comparatively young town, we have the energy and progressive spirit by which every young city in America, I believe, is characterized, and it gives me untold satisfaction to know that in the commercial strife incident to the great development of our country we still have the ability to recognize the necessity of cultivating the mind of man and giving him broad and thorough education. Of the institution which is opened to-day modesty forbids me to speak. To those who are going to make it a success and to those who have made great colleges a success I leave the expression of opinions which I might hesitate to form. But to all the distinguished guests of the new university I desire to say that although our city is small, as cities are measured, and thus unable to offer many of the entertainments and attractions of larger metropolitan cities, the hospitality we offer you comes from our hearts, and our desire to make your visit a pleasant one is not to be measured in any respect by the size or ways of the town, but by the ways and size of the human heart itself.

I now have the pleasure, ladies and gentlemen, of introducing to you the chairman of the Board of Trustees of the Rice Institute, a gentleman of high standing in this community, who has done a great work in its behalf—Mr. James A. Baker of Houston.

MR. JAMES A. BAKER: *Your Excellency the Governor, your Honor the Mayor, and you my Friends and Guests of the Rice Institute*—I am commissioned by the Rice Institute, whose dedication is to letters, science, and art, to extend to you, collectively and individually, a cordial welcome, not only to the halls and home of the new institution, but also to the homes and hearts of the people of the whole city of Houston.

As America a little more than a hundred years ago achieved her national independence and established on her eastern shores an asylum for those seeking liberty, so, too, have we, through the magnificent generosity of William Marsh Rice, established in the far Southwest the Rice Institute, an asylum of learning; and in the name of this new university I extend a welcome to all to come and drink from the fountains of knowledge which have been provided for this festal occasion.

And especially do we extend a glad welcome to those of our guests who have come to us from foreign lands.

A joyous welcome indeed to the representatives of the great French Republic; for it was she who more than a century ago recognized the independence of this country and gave to America the brilliant Lafayette, who in turn gave us generously of his blood and fortune, that the spirit of liberty might flourish upon our shores.

An equally warm and cordial welcome to the representatives of the great German Empire—the Fatherland. She

not only furnished us a distinguished soldier who fought with our forefathers the battles of our Revolution, but she has freely given us thousands upon thousands of the sturdy citizenship of our people, who have cultivated the waste fields of the State and nation until they bloom as the rose.

A warm and joyous welcome to the distinguished representatives of imperial Spain, for to her we are indebted for the patronage of the intrepid discoverer of America. In the heartiness of this welcome we wish you to feel that all of the wounds inflicted by the late unpleasantness between Spain and America have long since been healed in the recollection of the bravery and the heroism of the soldiers of both armies.

And a threefold welcome to the distinguished representatives of grand old England and merry old Scotland. In coming to America you come among us as kinsmen who are flesh of our flesh and blood of our blood. All the years which lie between 1776 and this year 1912 have only served to teach us mutual sympathy and to strengthen the bonds that bind our hearts to our mother-country.

Welcome, thrice welcome, one and all, to the hearts and homes of our people.

MAYOR RICE: It is my pleasure to introduce to this audience the Governor of Texas; and when I say the Governor of Texas I mean the man who governs the largest area of land as a State in the American Union, and who, as a typical American, stands before the people of the United States as the chief executive of this great commonwealth—the Honorable O. B. Colquitt, Governor of Texas.

GOVERNOR O. B. COLQUITT: *Mr. Mayor, Guests of the Rice Institute, of the City of Houston, and of the State of Texas, Ladies and Gentlemen*—The most humble citizen of

Texas may enjoy the privilege of being governor of this State, and on this occasion I feel myself to be the most humble of the humble. I am glad to be present on this occasion. I feel that I am indeed fortunate in being present. As chief executive of this State I am proud to come to Houston and welcome the representatives of American and foreign universities, distinguished scholars and scientists of England, France, and Holland, of Germany, Italy, and Spain, who have come to participate in the inauguration of the Rice Institute.

Within seventeen miles of this city is the San Jacinto battle-field, where the Republic of Texas was born. In this city of Houston, which used to be the capital of the State, within three blocks of this auditorium, the Congress of the Republic of Texas used to assemble in a log cabin, and to that log cabin the nations of the earth sent their representatives in recognition of the republic. And now, in these latter days, you have the Rice Institute, a great private institution magnificently housed for the public good, and the nations of the earth send their representatives here to welcome it into the fold of educational institutions.

With a handful of men under the leadership of Sam Houston, the independence of the republic was achieved in 1836. Since that day the progress of the American people has been truly wonderful. The progress of the people of Texas has been even greater. We have builded without assistance a magnificent civilization. I say without assistance, for even William Marsh Rice's splendid contribution was a product of Texas, because, although a native of Massachusetts, he came to Texas in his early boyhood and here made his fortune and his career.

I am happy to welcome you to Texas because Texas is made up of people from all the nations, and some of the

best people we have are among those who have come from other nations. I am proud to say that my own mother's family came from Holland, and that the adjutant-general of my staff is an Englishman.

I am proud, my friends, of the State of Texas. I am proud of its magnificent territory, proud of the progress that we are making in educational matters; and I want to say to you that as governor of Texas I am proud of the form of its government and of the government of this nation, the government of Washington and Jefferson, of Madison and Franklin. They founded a government based on a written constitution, written for the purpose of defining and limiting the power of the government. Freedom of conscience, freedom of religion, the right of each man to listen to the dictates of his own conscience, these are the proudest heritage of American citizenship enjoyed under this constitutional government. And I want to say, without disparagement to any other nation, that there has been more advancement in science since the Declaration of American Independence than there was during six thousand years before.

As I said a moment ago, the capital of this State, of the Republic of Texas, used to stand within three blocks of where you are now sitting. Representatives of foreign nations, of the French Government and of the English and German empires, came to Houston to represent their people at the capital of the Republic of Texas. In the meantime, we had knocked at the door of the American Union for entrance; our knocking was finally answered, and we became a part of this Union, and to-day we are the proudest part of these United States.

The Mayor of the city of Houston was very modest indeed when he told us that Houston is a small city. I want to say that Houston is not a small city, and I welcome you

not only to the largest State in the Union, but to the largest-hearted municipality you will find between the rising and the setting of the sun. And now I want to invite those of you who are looking for a haven of prosperity, a haven of political and religious peace, to make your permanent residence in Texas. We do not ask your religion, we do not ask your politics, we do not ask you where you graduated—I had not the chance to graduate anywhere myself. All we ask is, Are you a man? We judge men by their merits. All shall have equal protection under the law. We are a truly cosmopolitan people, and live by the freedom of democracy. The Rice Institute is one of the results of this freedom of spirit. This spirit of independence, this spirit of hope, this spirit of progress prevails everywhere throughout Texas. And, my friends, I want to say that so far as I am concerned, and so far as my influence might go, I would rather have founded the Rice Institute and provided for its maintenance to educate the hearts and the minds of the people of Texas than to be emperor of any foreign nation of the earth.

Now, Mr. Mayor, I came here without any written speech. I have been so busy attending to the necessary affairs of the people who occupy the territory extending from Orange to El Paso, a distance of nine hundred and thirty miles, and from Brownsville at the mouth of the Rio Grande to Amarillo, a distance of nearly eleven hundred miles, that I have not had time to prepare a speech for you; but a man who is governor of a territory so extensive has so many features of life presented to him daily that he is always bold enough to make a speech on any occasion.

Again I thank you one and all for coming to Houston and for the distinction you are lending the city and the State on this auspicious occasion, and again I welcome you from the

bottom of my heart, and I speak for the entire citizenship of Texas in extending you that welcome.

MAYOR RICE: We have listened to Governor Colquitt's cordial address of welcome, and now we are going to have the great pleasure of listening to a response from one of our most distinguished foreign visitors, Professor Sir William Ramsay of London, England, who, with Lady Ramsay, has come to assist in the launching of Houston's university.

PROFESSOR SIR WILLIAM RAMSAY: *Your Excellency, your Honor, Ladies and Gentlemen*—I have to make one remark before beginning, and that is to allude to the way in which the mayor expressed his invitation of welcome. He called me a "foreign visitor." I decline that aspersion. I am not a foreign visitor. When we have the pleasure of receiving you Americans in London, we don't call you foreigners. We don't expect to be called foreigners when we come to your country.

Now, ladies and gentlemen, what your mayor has said about the progress of education is true. It is absolutely true. The governor has hinted that the progress of education, the progress of science, has been contemporaneous with the separation of America from England. That reminds me that I once heard your ambassador to Great Britain, Mr. Choate, make the following remark at a dinner given on the occasion of the ninth jubilee of the foundation of the University of Glasgow, which took place in 1901. He said: "Your institution was founded in the year 1451, about the same date as that on which America was discovered. Before that you had what you justly called the 'dark ages.' "

We are separated, America and Britain, but we on our side welcome the close alliance which now exists. I see in

front of me the word "Peace." I am reminded of one of your great cities in America—Philadelphia—and of its motto, "*Philadelphia maneto*" ("Let brotherly love continue"). I also see numerals on the same flag on which is written the word "Peace," running from one to ten, which I presume is intended to recall the ten commandments. I presume it is intended to mean that the people here are not to break them. Well, ladies and gentlemen, up to the ninth commandment I am willing to obey; but when it comes to the tenth, I am not quite sure. I have seen the Rice Institute this morning, I have read its papers, and I know what it intends to do, and I am not sure that you have done right to show us the Rice Institute before suggesting to us that tenth commandment.

We know you have before you a magnificent career. You have begun it well by making appointments of eminent men to be your professors. You have begun it well by the number of students whom you have enrolled. I am told that only about one fourth of those who could have attended and who could have come in have been accepted. You are going to keep your standard high.

Well, gentlemen, there is one thing that has struck me as a danger threatening American universities. It is the large number of students enrolled. These numbers are growing too large. Let me give you a specific instance. The professor of chemistry in the University of California told me lately that he had over two thousand students to teach. To teach two thousand students is an impossibility. What can you do? My suggestion is this, that you increase the number of your teachers. Don't appoint assistants, teachers, lecturers, but create entirely separate departments. If you require two professors of philosophy, have them at double expense. It pays. You cannot turn out students as you

would needles or wire or nails. Learned men cannot be made like them. Each student must come into personal contact with his teachers.

And now, gentlemen, speaking for your foreign visitors and guests, I have the honor to express our gratitude to you for having given us this opportunity of coming among you. We have passed, my wife and I, through this great country of Texas. Of course I suppose that while alongside of a railroad one sees the homes and the farms of the settlers, when one goes back of a railroad the country loses signs of being inhabited, yet what we have seen of the country has been magnificent. It is evidently very fertile, and it is becoming populated, and you have only to wait and let immigration take place to have Texas become one of the greatest imperial States of this country, and one of the finest in the world.

We have come to you, we have come to see your country, we have come to make friends with you, and I now desire that you will give us every opportunity to do so.

I thank you very heartily for your cordial reception.

I will now use a custom which is not included in American gatherings of this kind, but is common at similar gatherings on the continent of Europe; it is to raise my glass and drink to "The Prosperity of the Rice Institute."

MAYOR RICE: Professor William Henry Carpenter, Provost of Columbia University, is one of our guests from the Metropolis of the Union. He has kindly consented to respond for the Eastern institutions. With great pleasure I present him to you.

PROVOST WILLIAM HENRY CARPENTER: *Ladies and Gentlemen*—The life of every human being in retrospect, I

imagine, has its quota of regrets for hopes unfulfilled and for opportunities wasted. Since I have been sitting at this table, I have added still another to my own total of regrets, and that is a regret that I am not a citizen of this great commonwealth of Texas. The governor's speech has filled me with desire. I belong to a community which, to be sure, has played its historical part in the evolution of a nation; but nevertheless, when I think over its past in connection with the governor's glowing picture of the future, it seems to me what we have done is little in amount and significance in its ultimate effect as an influential part of the whole.

The president of the Rice Institute has asked me to say a word on behalf of the Eastern institutions of learning. In thinking over what I was to say before I came here, it seemed difficult to make a choice where so much might be said at the launching of a new educational enterprise under the peculiarly favorable conditions that attend the present. Some thoughts, however, have suggested themselves, that perhaps may be presented as bearing upon the occasion that has called us together.

The one thing that I have thought of is the object-lesson that is made by such a gathering of men as are present here to-day. For it seems to me that no gathering of men, for whatever purpose it is arranged, or in whatever spirit it is intended, is so significant as is an assemblage of this kind, that has brought learned men across the seas and from so many parts of this great republic.

No gathering of men speaks so much for the solidarity of human interests as does an educational gathering such as this. There are other gatherings of men that have for their object the extending of the propaganda of some particular subject. There are political conventions that are got together in a state or in a nation for a single definite purpose.

But here is a gathering from the ends of the earth for a purpose that is broader in its intention and its results than any other—the common purpose of education.

And another thing comes to my mind in looking over the names of the delegates to your celebration. I have thought not only of the solidarity of interest, but of the permanency of interest that is indicated by the gathering here to-day.

No human institution is so permanent as a university. Dynasties may come and go, political parties may rise and fall, the influences of men may change, but the universities and what they stand for go on forever. Oxford and Cambridge have outlasted changes of party and of policy. The University of Paris has withstood a revolution that transformed the face of the nation, but it exists to-day stronger than ever before. The University of Bologna, to go further afield, stands almost alone as a monument of previous greatness in a city whose importance is wholly a thing of the past and whose very existence has almost been forgotten. And in our country universities have been founded that have outlasted the long list of presidents of the republic. Harvard and Yale and Princeton and Columbia, in fact, have witnessed the change from the colonial government of England to the democracy of the present day. Whigs and Tories have come and gone, political waves have risen to the surface and have been submerged, generations of men have lived and died, but these universities have gone on their way to the present time, and, well founded, they will go on forever.

No human activity is so permanent as the influence of the university, and the opportunities of the university are greater to-day than they have ever been before in the civilized world. This is possibly true as well of the great industries of this great country, and the two—industry and education—

go more and more hand in hand together. The present time is pre-eminently a time of awakening in industry and education alike, and industry, in its many-sided interests, is looking more and more to education, even in an age that is called material, for enlightenment and support. Out of the laboratories of the universities are coming to an increasing extent the influences that make for economic and industrial improvement and contribute to the betterment of human living and to the good of mankind.

In America we have had in education an era of theology at the beginning, which was succeeded by an era of law, and which, in its turn, has been succeeded by the era of science in which we at the present time live. It seems to me that the time is ripe for the founding of a university such as the Rice Institute will doubtless develop into in the near future. There is in my mind, and in the minds of many who have carefully watched the signs of the times, the possibility of the development of a new interest in America in the arts and in letters and in all the liberal knowledge that is included under these names. By taking advantage of the opportunity which is plainly open to you in working out your educational plan, and by firmly basing a scientific superstructure only upon a broad cultural foundation, you will not only exercise an important influence in that movement of enlightenment that is sweeping through this part of the world, as the governor has so proudly and eloquently explained to us, but you will contribute your part to a movement that presently, unless all signs fail, will extend over the United States.

There is an old motto, a motto that has come down out of the distant past: "*Ex oriente lux*" ("Light comes out of the East"). In the establishment of the Rice Institute you have done something that in a future that may not be distant will lead us to say, "*Ex occidente lux*," as well, for light will

surely come to us out of the West as a consequence of your action.

Well, gentlemen, I do not know that I have much more to say. I should, however, after all, like to say just one more word about the opportunities of a great university, such as this in the future is to be, as a factor in the life of the nation.

Somebody has said, "The weaknesses of a democracy are the opportunities of education." I think there is a great deal in that to ponder over, because a democracy—this democracy—does have its weakness as well as its strength. A great weakness, as I see it, in this democracy is the indifference that largely prevails throughout the country to the broader education of the body of the people. If we go on along those lines in the future as we frequently follow them to-day, we shall develop here in America not at all what the forefathers of the republic had in mind when they signed the Declaration of Independence, and we shall have a government of the many by the few, instead of a government by all, as is inherent in the very life of a democracy. It is the business of the educator to recognize this weakness, to come down from his heights into the valleys, and to work in the light that has been given him for the extension of educational opportunity that will make in the end for the salvation of his country.

Now, gentlemen, in closing, I wish to extend to the Rice Institute, so auspiciously founded to-day, the congratulations of the older Eastern universities upon your entrance into the work of education—a work, maybe, that has its discouragements, but which has in an extraordinary measure its profound satisfactions. My university—Columbia University in the City of New York—was founded back in 1754, so that I am speaking in a way, at least by proxy, out of the

depths of time and experience. I wish, however, not merely to bring to you the felicitations of our universities in the East on your birthday, but to extend to you by a heartfelt grasp of the hand an invitation to join our ranks, in what seems *to me in many ways to be more than almost any other human institution whatever, a community of the immortals.*

I thank you, gentlemen.

MAYOR RICE: It is now my pleasure to introduce to this audience Professor Vito Volterra of the University of Rome, life Senator of the Italian Kingdom, whom we welcome most cordially from the south of Europe to this southern country of the American nation.

PROFESSOR SENATOR VOLTERRA: *Mr. Governor, Mr. Mayor, Ladies and Gentlemen*—I should like first of all to declare my great pleasure in being present at this festival, and my appreciation of the cordial and bountiful hospitality that I have found here in Houston. Allow me to express the feeling of admiration that I experience in visiting this great new country, an admiration that has changed only to increase since my last coming to America. Your high civilization and enterprising spirit have been able to conquer an entire continent, to create as if by enchantment marvelous cities like this which we are visiting now. These grow up in a few years. They provide themselves not only with all the modern comforts which make existence easy and agreeable, but also reach a high place in life that is intellectual and moral. And we see here to-day one of the most notable examples of this spirit, as we inaugurate this magnificent university, the gift of William Marsh Rice. He has rendered to the culture of his country a magnificent, well-conceived service.

No institution could more impress the mind, could make more manifest the difference between the old continent which we have left, and this country, full of youth and spirit, which we have found. Our universities have ancient and most deep-reaching traditions. Every idea that has been developed in moral and intellectual fields, from the time of the distant Middle Ages until to-day, has left its impress upon them, and their life exhibits always the results of this long development of customs and thought. But you have created institutions from the beginning and at once, universities in which you can accommodate everything to the demands of the present, without the embarrassment of a single relic from the past.

Yet the men of the old universities of Europe, and those who constitute the new ones in America, have the same high aspirations and scientific ideals in common. Rendering mutual aid, they can and ought to march together. Both should bring their contributions to the collective labor that tends to scientific progress and evolution.

It is for this reason that I see with such great joy, united here before me, the representatives of these two continents.

MAYOR RICE: I now have the honor of introducing to you Professor Sir Henry Jones of the University of Glasgow. We welcome this distinguished philosopher warmly from a city whose example we have sought to emulate in the Houston ship-channel.

PROFESSOR SIR HENRY JONES: *Your Excellency the Governor of Texas, your Honor the Mayor of Houston, Ladies and Gentlemen*—We have been told many things this afternoon, and told them well. You will pardon me, I am sure, if my words are few; I am not convinced that though they

were many they would add to the value of those to which you have already listened with such courtesy and so gladly.

But I have two duties to perform, and I can neglect neither. The first is to express my satisfaction in being present amongst so many lovers of learning not only from this city but from the States of America and of western and southern Europe. I count it a great privilege. On the last occasion of such a gathering as this at which I was present, the jubilee of Lord Kelvin as professor in the University of Glasgow was being celebrated. Professor Ker of London University compared it to heaven. "You meet so many old friends," he said, "and you are so surprised to see them."

My second duty and my still greater privilege is to join with you all in good wishes for the prosperity of the Rice Institute. You are entering to-day, ladies and gentlemen, upon an enterprise whose significance for the future no man can measure. There is no doubt as to the means whereby man masters his world and converts its blind forces into beneficent powers. They are the same means, in the last resort, as those which help him in the still more difficult enterprise of mastering himself. They have all one, and only one, purpose. It is that of so operating upon the mind of man as first to awaken and then to foster that passion for truth which is the condition of all sincerity in conduct as well as of all advancement in knowledge, and which brings a clear conscience as well as a clear mind. Your Institute, in the last resort, is dedicated to the making of character—and character, good or bad, builds up or pulls down civilization. It is the greatest thing in the world. With all my heart I desire your prosperity in your dealing with it, for in it is the true measure of the attainment of the end which you have set before you in the Rice Institute—"the advancement of literature, science, and art."

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MAYOR RICE: We have among our guests Dr. George Cary Comstock of the University of Wisconsin. It is now my pleasure to present him to you, with a request that he speak not only for his own university, but for the other institutions of the West.

DEAN GEORGE CARY COMSTOCK: *Your Excellency the Governor, your Honor the Mayor, my Colleagues, Ladies and Gentlemen*—On behalf of the university I represent—Wisconsin—and on behalf of her sister universities of the Middle West, in so far as I may speak for them, it is with great pleasure that I return to you our thanks for the courtesies that we have received on this occasion, and our appreciation of the very warm hospitality that the city of Houston and the State of Texas have extended to us.

But I stand here, Mr. Mayor, not simply as the recipient of your kind hospitality, but as your fellow-countryman in welcoming the addition of a new star to the educational firmament of this land. I desire to join with you especially in extending my share of recognition and praise to that new name that has been added to the list of distinguished benefactors of American learning and science, to that list which, beginning with Harvard and Yale and continuing in unbroken line through the generations of our forefathers, to-day has added to its roll the name of William Marsh Rice.

We stand at the beginnings of the Rice Institute, a notable foundation placed in the midst of an empire ready for its service. It is the function of its honorable president and its Board of Trustees to care for the future of that institution, to determine the lines along which its development shall take place; and far be it from me upon this occasion to express to them aught other than sympathy for their undertaking. Words of advice are not needed, and would indeed

be out of place at this time. But I may speak to some of you gentlemen here, who are men of affairs, who enjoy the fruits that come out of the educational policy of our land, and who desire to see that policy grow and bear fruit fairer and better than any yet realized.

The greatest Englishman of our day, politician, administrator, financier—I mean the late Cecil Rhodes—cherished such desires from boyhood to the close of his career, and dying at the height of his power and influence, left a vast fortune to be devoted mainly to such ends. Let me put before you briefly his aspiration and the purpose that he sought to accomplish by endowing at Oxford University some two hundred scholarships to be filled by the most promising youth that could be collected from English-speaking lands; young men of power and purpose, of moral aspiration as well as scholarly attainment, who were to be assembled at that ancient seat of British culture, “for breadth of view, for instruction in life and manners,” and—mark the vision of the empire-builder!—“to secure an attachment to the country from which they have sprung.” Does his vision appeal to you? Is it worth while to bring together during their impressionable years the youth that have shown promise of future leadership and to give to them a common training in the best traditions of the race? To wear down the corners of prejudice, to round out the defects of provincialism, to fill up the gaps of ancestral experience? Rhodes thought it was. I share his belief, and I appeal to you, gentlemen, shall this remain only a British ideal? May we not look forward to its Americanization? May there not be placed upon the head of the Rice Institute a great crown of glory in that it shall be a center toward which the youth of the world shall come to be trained in the ideals of American life and

light, of religion and liberty, for the use and profit of the whole earth?

But, gentlemen, I turn from this concept to another expressed with equal clearness in the words of Cecil Rhodes, and which seems also noteworthy, albeit in a very different way. Having confided to Oxford the splendid commission above suggested, he pays his respects to its personnel in the words: "As the college authorities live secluded from the world, and are so like children as to commercial matters, I would advise them to consult my trustees," etc. On behalf of our American universities, let me disclaim any such concept as to the kind of men that should compose the faculty of an institution of learning. We of the North and Middle West believe that a great university should be an institution to which the community may turn for guidance, for leadership, for expert advice in matters of science and scholarship that lie beyond the range of every-day experience. It should be a place in which knowledge grows; in which, year by year, substantial additions are made to science, to letters, and to art; but in no less measure should it be a place in which that knowledge is utilized for the benefit of the man on the street. A major function of the university is to make abstract science concrete and profitable to mankind, and that end cannot be secured by the dreamy recluse of Mr. Rhodes. That type indeed has its uses, and with its disappearance something would be lost from the sweetness of life, but let us not trust to it alone for our academic staff.

Here are two ideas that I would bring before you: that the institution in whose home we meet to-day has before it an extraordinary opportunity to serve humanity as one of its nerve-centers, and that it will be a stimulus to youth summoned hither from an area far wider than the prairies of

Texas and placed under the influence of men awake to the needs and tendencies of the times and capable of giving will and heart to service that shall be as thorough and competent as it is devoted.

And now let me bid you join in pledging to the Rice Institute and its successful fulfilment of its mission that good old academic toast:

"Vivat, crescat, floreat in eternum!"

MAYOR RICE: Among the university presidents of the East who have come to visit us at this time is the distinguished president of Lehigh University, Dr. Henry Sturgis Drinker. I have great pleasure in asking him to address you.

PRESIDENT HENRY STURGIS DRINKER: *Governor Colquitt, Mayor Rice, President Lovett*—Among the gracious words of welcome which have greeted us who have come from distant points to rejoice with you to-day were words of kindly thanks and appreciation for our presence here. Sirs, it is for us from full hearts to thank you for the opportunity to share in the great work to-day inaugurated, and I assure you we appreciate the privilege.

We come from the North, the South, the East, and the West to draw from the Lone Star State the new inspiration of liberty that you gave us of the older States in your struggle for independence, and now you are setting us a further example in your successful educational progress.

Columbia University has just spoken to us from among the older institutions of our land. There was a time when we used to rate Lehigh University as of the younger brethren in the educational family. But we have moved up into the middle-aged class. The donation of Asa Packer, amounting

in the aggregate to about three million dollars, and beginning with five hundred thousand dollars in 1865, to found my Alma Mater—Lehigh—was at that time said to be the largest sum ever given to education. But now you spring full-panoplied into the arena with your magnificent endowment, and withal, with the past half-century of experience of our country in the working out of our American system of higher education, of which you may, and will, avail.

Surely your future is bright, and surely the founder of this great institution—great already, greater in its potentialities for the future—merits the application of Sophocles' words where he says in his "Cedipus":

*"Methinks no work so grand
Hath man yet compassed, as, with all he can
Of chance or power, to help his fellow-man."*

MAYOR RICE: Professor Emile Borel, a celebrated mathematician and educator of France, has come to the inauguration of the Rice Institute as the official delegate from the University of Paris, the mother of all modern universities, to participate in our academic festival. You will, I am sure, share the pleasure and honor I feel in introducing him to you.

PROFESSOR EMILE BOREL: *Mr. Governor, Mr. Mayor, Ladies and Gentlemen*—The presence on this occasion of so many eminent representatives of American and European universities shows clearly with what interest the learned world regards the inauguration of your new university. I am happy to convey to you the greetings and congratulations of the University of Paris, which is one of the oldest of universities. I am happy to thank you, both in its name and in my own, for your cordial hospitality. The municipality of Houston does us the honor of receiving us to-day as its

guests. Permit me to raise my glass to the rapid extension of this great new city, so active and so rich, which, along with its commercial development, has desired to have a corresponding scientific and intellectual development, in such a way as to become doubly a center—namely, a business center and a center of thought. I drink most heartily to the prosperity of the city of Houston and to the prosperity of the Rice Institute.

MAYOR RICE: It is now my pleasure to call upon the president of one of our own Southern universities, who will respond on this occasion for the universities of the South—Chancellor Kirkland of Vanderbilt University.

CHANCELLOR JAMES HAMPTON KIRKLAND: *Your Excellency the Governor, your Honor the Mayor, Ladies and Gentlemen*—It is a pleasure to be here on a day that, I think, will live and go down in the history of this country and the State of Texas. I have had the honor as well as the pleasure of attending and participating in many educational conferences and many gatherings of men of science and letters, but I never attended one launched upon such a broad scale—such a truly cosmopolitan scale—as this gathering incident to the dedication of the Rice Institute. It means that the great colleges of the world recognize the Rice Institute as one of their number.

When all who have participated in these exercises have passed away, and all who are now appearing and bearing the glory of building this new institution have passed, their work and this beginning of this Institute will be remembered in history as the greatest day in the history of Houston and Texas.

It is a pleasant thing, Governor Colquitt, to come to Texas. Tennesseans know that, and they come here in

abundance. You are gracious, Mr. Mayor, to call for comment from a representative of my State. Among the names most revered in the State of which I am a citizen is the name of Sam Houston. Do you know, sir, that a very curious thing is this, that every historian of Tennessee who has written about Sam Houston and his life has raised the question, but never found a solution of the question, why Sam Houston ever left Tennessee and came to Texas. But no man who has ever lived in Texas has ever raised the question.

It is of very great significance that the governor of the State is here from his duties to take part in the exercises of to-day, to participate in the inauguration of a great private institution, as he has just said. I do not agree with the governor. This great institution that you are launching here is not a private institution. There are no private educational institutions, gentlemen. All institutions for the education of a people are public institutions, devoted to public acts and public enterprise, and always part of the great public interest. As we come to this festal day, a few things of great significance occur to those of us who are working in other institutions, especially so if those institutions happen to be in the South.

In the first place, the Rice Institute begins its history without the dreaded poverty that has marked the growth of every Southern institution, and of almost every institution in this country, until now. We of the South know what it is to pass through individual and institutional poverty, and of the two, I may say that institutional poverty is worse, much worse, than individual poverty, more harassing and harder to get rid of.

Another striking factor in the greatness of this institution I speak of with real gratification. The Rice Institute will not be compelled to follow the example of so many insti-

tutions, and engage in the mad race for numbers. It can afford, under its endowment, to make it a badge of honor to have been a student of the Rice Institute, and I am sure that just such high standards will be maintained.

Still another factor I would mention—though I mention none of these things to give advice. This institution will be conducted, by the history of its being, to a certain specific line of work, to a line that we may call scientific in its broadest sense, scientific in a sense that would neglect neither the spiritual nor the commercial value of science. Now, in that broad sense, we look to this institution to be a mediator between those two great ideas. And in this work of mediation it will do great and needed service to the South. What resources of the land here are undeveloped! Throughout our whole history we have been lingering along, and we have followed along the way of our fathers, believing that what was good enough for them would be good enough for us. But now in the South we realize that, while we honor the past, the past is not good enough for the present and much less is it good enough for the future. Our leaders are breaking away from the past traditions; they are thinking for themselves, and they are speaking for themselves. The day is near at hand when Southern men shall again enter in power and influence the halls of state which their fathers held under possession in the earlier years of our national history.

And so I look to the Rice Institute to lead a new South, a South that shall walk hand in hand, in science, industry, and service, with all other sections of our country and with the whole world.

MAYOR RICE: Among the distinguished European scientists present this afternoon is Professor Hugo de Vries of

Amsterdam, eminent for his researches in biology. I now have much pleasure in presenting him to you.

PROFESSOR HUGO DE VRIES: *Mr. Governor, Mr. Mayor, Ladies and Gentlemen*—I bring greetings from the University of Amsterdam to the Rice Institute, now entering upon a university career begun under conditions the most favorable. The universities of the old world as well as the universities of the new world welcome the advent of this new university. There is room in the world for more and more universities, because the tasks of science and education, always vast, are becoming vaster and vaster. This is not my first visit to America. And here in Houston and in Texas, as on previous visits, I find warm hospitality and friendly greeting. I am grateful to the president and trustees of the Rice Institute, to the mayor and citizens of Houston, and to the governor and people of Texas for the gracious hospitality I am enjoying as their guest. For the new university I predict a bright future full of service to science and to Texas. To that prosperous future I raise my glass in high hopes and confident expectation.

MAYOR RICE: We have listened to warm responses from our foreign guests, and to equally cordial expressions from American institutions of the North, South, East, and West. It is now my pleasure to call upon a university man of Texas who will respond for the universities and colleges of this State—President Samuel Palmer Brooks of Baylor University.

PRESIDENT SAMUEL PALMER BROOKS: *Your Excellency the Governor, your Honor the Mayor, Ladies and Gentlemen*—I confess very much personal embarrassment that I, a simple Texan, reared on the frontier of things, should be

associated here with these distinguished guests who have come from the learned scientific centers of the world. I am conscious of my inability to measure language and knowledge with these men, skilled as all of them are in their respective fields.

Gentlemen of the scientific world, you have a welcome in Texas. What we may lack in expressing this welcome we fill full in the bounty of our sincerity. For your learning we have high respect. You have ceased to surprise us by your discoveries. If you shall reduce all old physical elements to one, or conserve the waves of the ever-rolling sea, or extract the heat of unmined coal, or find perpetual motion, or increase the working-hours of honey-bees by crossing them with lightning-bugs, we Texans will never run from the facts.

President Lovett, Professors of Rice Institute, Members of the Board of Trustees, I give congratulation to you each and all on this happy day, the culmination of labors that make possible so auspicious an opening of this promising institution.

Ladies and gentlemen all, we here together represent the aristocracy of science and letters, which at last is a pure democracy where the merit of every man counts. However exalted we may become, we delight to sit at the feet of those able to teach us. However humble may be the walk and work of the schoolmaster, it carries the dominant note of strength, without limits of language or law or geography. However many of the old and worthy universities and colleges of the East there may be, none will fail to rejoice at the coming of any new institution giving promise of genuine power in the development of men. Right well we know there is no competition in real culture.

As I speak these words of congratulation on this felici-

tous occasion, I do not forget the true and tried work of the institutions of learning in Texas. While young to you, I remind you that Baylor University received its charter from the Republic of Texas, which in the council-chamber of the nations of the earth for ten years was counted worthy to sit in the person of its ambassadors. Her students have walked untrodden places and welcomed learning from any source. Baylor as a private institution does not work alone. By her side in fidelity to truth and service have walked Southwestern, Austin College, and others of fewer years. I ask you to look out upon the work of the University of Texas, whose president and representatives are with us to-day. Its graduates are actually sitting in the councils of learning and power the world over. Nor do I forget the Agricultural and Mechanical College, whose purpose has been, and is, to dignify the knowledge of things pertaining to the earth and the handicrafts of men.

All Texas institutions are ready to learn and to utilize the experience of others. We do not work for ourselves, but for our country. We do not put limits on what we call our country. We love our State, our nation; we love the world, and believe heartily that we are a part of it. We believe in the brotherhood of man, and that God is no respecter of persons. Our work is world-wide.

On behalf of the educational institutions of Texas which I have the honor to represent, let me give thanks to the president and trustees of the Rice Institute for the pleasures of this day, and hope for them fields of usefulness as broad as the world. With you, sirs, we join hands in common service for the advancement of the human race.

MAYOR RICE: On behalf of our citizens, I thank all these gentlemen most warmly for the addresses with which they

have honored us on this occasion. I beg also to assure them and all of you that the welcome which we have extended at this time has no limit either of duration or season. We want you to stay not only through the celebration of the next few days, but just as much longer as you can conveniently arrange to remain with us, and we want you to return to see us just as often as you can. Before closing the exercises, I extend a cordial invitation to all our guests to sit with the governor and his staff for a group picture that is to be taken in front of this auditorium, immediately following the adjournment of this meeting.

TOASTS AND RESPONSES AT THE SUPPER GIVEN BY THE TRUSTEES AT THE RESIDENTIAL HALL IN HONOR OF THE INAUGURAL LECTURERS

PRESIDENT LOVETT: *Ladies and Gentlemen*—This evening's program, arranged by the trustees in honor of the Inaugural Lecturers of the Rice Institute, began with a concert of the Kneisel Quartet in the Faculty Chamber, and has been continued by the supper of which we have just partaken in the first formal function of its kind to be held in the Commons of our first Residential College. The concluding part of the program presents a most inviting prospect of the Founder's high purposes, for we have asked Drs. van Dyke, Conklin, and Cram to respond for Literature, Science, and Art, respectively, while Professors Altamira, Jones, Borel, Volterra, Ramsay, and de Vries have consented to speak in turn on History, Philosophy, Mathematics, Physics, Chemistry, and Biology. And to preserve as far as possible a balance between science and the humanities, which we have sought to hold throughout all the academic events of these three days, the responses this evening will occur in the following order: Literature, Mathematics, Philosophy, Physics, Science, Chemistry, History, Biology, and Art.

On finding myself with Sir Henry on my left and Sir William on my right and their equally eminent seven colleagues both right and left, I feel to-night as the man did respecting the Shakspeare-Bacon controversy. He said he didn't know whether Bacon wrote Shakspeare's plays or not, but if he didn't he missed the greatest opportunity of his life.

We believe that the gentleman whom I am about to introduce to you has written most of his own verses and stories, but, nevertheless, his contemporaries have found in all of

them a cipher, and wherever this cipher turns up it says one and the same thing: The man who wrote these lines was a lover of nature and a lover of men. And consonant with this cipher one finds "love, beauty, joy, and worship," which, as Plotinus says on the great arch of the sally-port yonder, "are forever building, unbuilding, and rebuilding in each man's soul." Ladies and gentlemen, I have the honor of calling on Dr. Henry van Dyke, man of letters, faithful friend, poet laureate of the Rice Institute, who will respond for "Literature."

DR. HENRY VAN DYKE: Nothing ought to surprise those who have been the guests of Texas at the inauguration of the Rice Institute, and nothing ever after can be too good for them. We have been lifted by the springtide of your hospitality to the absolute high-water mark, and henceforth we must measure festivals by comparison with this.

One thing, however, has astonished me a little during these days, and that is to find so many "lions" in Texas: academic lions, scientific lions, lions of the world of higher education. Among these distinguished representatives of famous institutions, these doctors of many degrees, a simple shepherd of the hills can understand how Daniel must have felt in the lions' den—perfectly safe but somewhat embarrassed.

I do not represent any learned institution, any scientific theory, any school of philosophy. Merely because I have written a few stories and a few verses, I have been asked to speak for Literature.

Literature is that one of the arts which works with the least costly of all materials—words—to embody the most precious of all human possessions—ideas. Any language that has expressed noble thought and feeling in lucid form

becomes classic. Any race that has succeeded in producing real literature, by virtue of that production becomes immortal. The one thing that does not die is the well-chosen word whose soul is the well-born thought.

Literature is the most humane and intimate of all the arts. It comes closest to the common life of man. Good books help us to understand our own hearts. They open the world to us. They are revealers and interpreters, friends and counselors. They liberate us, at least for a little while, from the slavery of time and space. And while the other arts in their perfection are not always accessible to those who are not rich in this world's goods, the best literature is usually the cheapest.

There has been a good deal of talk about an "American literature." American literature has begun. It began when the life of the American people became conscious of deep thought and true feeling, and took expression in literary form. It will continue and grow and develop, this American literature, just as the life of the people of America becomes deep, strong, vital, and sane. It cannot be made to order. It cannot be made on a cook-book recipe. It cannot be made by any plan of localism, or by the division of the country into geographical sections, so that we shall have a literary school of the southern half of Indiana, or a literary school of the eastern corner of the northern half of Texas. That is not the way literature is made. Literature will grow when the life of America is so enriched with deeper emotion and thought that it must find expression in our common and classic English tongue.

Literature cannot be taught. There are things in our universities that we call "chairs of literature." Those who occupy them, if they are doing their duty, are simply "teachers of reading"—that is all. Literature cannot be taught,

any more than any other of the higher arts can be taught. You cannot make a literary man by instruction in a classroom. You can correct his grammar. You can correct his spelling; that is to say, you can do something in that direction as long as the "Simplified Spellers" remain in abeyance. But you cannot make him a writer, any more than you can make him a sculptor, unless Nature has bestowed the gift.

The best that we can do for Literature in our universities is this: to cultivate an appreciation for that which is finest and most humane in the writings of the past; to teach young men and women to know the difference between a book that is well written and a book that is badly written; to give them a standard by which they may judge and measure their own efforts at self-expression; and to inspire in the few who have an irresistible impulse to write, a sincere desire to find a clear, vivid, and memorable form for the utterance of the best that is in them.

This is something which I think the university may well propose to itself as one of its high objects: to promote the love of good literature, and to endeavor that no one shall obtain an academic degree who does not know *how to read*—to read between the lines, to read behind the words, to enter through the printed page into a deeper knowledge of life.

I hope that the Rice Institute, with its magnificent outlook toward science, will produce scientific men who shall be at the same time men of true culture, who shall illustrate that type of science whose representatives we have listened to here—men whose knowledge of the facts and laws of the physical world does not blind them to the beauty and power of those ideals, memories, imaginations, and hopes which are perpetuated in literature for the cheer and guidance of mankind.

PRESIDENT LOVETT: It was at the Sorbonne, I believe, that the first conspicuous public reference to the plans of the Rice Institute was made, and in one of the lectures which, as visiting professor, the last speaker delivered on the "Spirit of America." We have with us on this occasion a distinguished permanent member of the University of Paris. By way of making him feel more at home at the table of this Residential Hall, I venture to remind him that his own ancient university was originally composed of residential colleges, and that the Ecole Normale, whose scientific studies he directs, is itself a residential college. Furthermore, the subject which he represents has a great community of interest both to the scientific and to the lay mind, for mathematics is as fundamental as logic itself to scientific inquiry, and shares with music the distinction of being a survivor of the Tower of Babel. On this high and noble theme I now ask Professor Borel to speak.

PROFESSOR EMILE BOREL: President Lovett has very kindly asked me to speak to you this evening concerning the rôle of mathematics in the domain of culture. It is a subject which seems somewhat dry and rather difficult to treat in an after-dinner speech. Mathematics is rarely considered to be an appropriate subject for conversation by those who are not mathematicians. People generally think that the science of numbers has no very intimate connection with life, and that mathematicians might without great loss to civilization remain shut up in their towers of ivory. Nevertheless, it is impossible not to recall that twenty-five centuries ago, under a sky as beautiful as is yours, it was precisely through abstract speculations that the great geometers began the liberation of the human reason. From these speculations geometry, algebra, mechanics, astronomy, and physics have

sprung. Through the logical play of his reason man has given himself an account of the laws which regulate the world. He has come to comprehend that blind chance does not preside over the destinies of the universe, and that the concepts accessible to the mind of geometers can serve to penetrate the great laws of nature. Therefore he has come to use these laws for the profit of human civilization. Accordingly, the mathematical reason is the basis of man's conquest of the universe. Is it not by virtue of mathematics that navigation of the seas has become possible? If the thinkers had not meditated upon certain abstract laws, could any vessel have been able to plow through the waves of the Atlantic? It is to mathematics that Christopher Columbus owed, exactly four hundred and twenty years ago, his ability to reach in safety these unknown shores. And they are the heirs of Greek thought who, realizing the great scientific movement of the seventeenth and eighteenth centuries, have made possible the great industrial inventions of the nineteenth century, the organization and conquest of the globe by human civilization.

The mathematicians are the pioneers of science. Often indeed their work is several centuries in advance of practical applications, but, without their works, discoveries the most admirable would have failed of any practical application. It is not sufficient to observe the facts: it is necessary to know the laws which govern these facts. Every one knows that the stone he drops will fall to the ground; mathematics alone has given, with respect to this fact which appears so simple, explications and formulæ which have been permitted most admirable mechanical applications.

The Rice Institute preserves by the side of letters and art a place for the sciences—for the mathematical sciences among others. In addition to the practical utility of which

I have just spoken, the mathematical sciences have an intellectual utility in the development of the human spirit. They accustom the intellect to the use of a rigorous and clear-cut logic; they render the understanding tractable to finesse of intuition and induction. I trust that in so magnificent a new university as is the Rice Institute mathematics may make many adepts. For if mathematical culture should be removed from the world, scientific culture would become as a tree whose roots had been cut. And in conclusion I raise my glass to Mathematics and the prosperity of the Rice Institute.

PRESIDENT LOVETT: The gentleman who has just spoken would agree with Gauss that mathematics is "the queen of the sciences." The eminent philosopher who is about to speak would insist that philosophy is the science of the sciences, the glory and the guardian of all the sciences. We have paid our tribute to philosophy on the chief stone of our first building, where one may read the tribute Democritus paid to science for its own sake when he exclaimed: "Rather would I discover the cause of one fact than become king of the Persians." This fine expression of the spirit of science on the part of the ancient Greek philosopher is rather more generous than is the attitude of the average modern scientist toward philosophy.

The intensely human philosopher on my left has told me in conversation this evening that to get a speech out of him to-night it would be necessary to stir his temper. It is in the affection inspired in all of us by the earnest appeal of his discourse as the sun was setting last evening that I venture to apply the necessary lash. To him there may perhaps be some stimulus in that ancient characterization of a metaphysician—a characterization so old, in fact, that the mind

of man runneth not to the contrary—namely, that a metaphysician is a blind man in a dark room groping after a black cat—that is not there! Ladies and gentlemen, I have very great pleasure in asking Professor Sir Henry Jones to tell us what Philosophy is.

PROFESSOR SIR HENRY JONES: Surely the hour of parting has come, if it is to come at all, and my stay amongst you is not to be permanent. It is not only the smallness of the hours of the night that suggests it, but the words we have just heard from the president. For what he has said indicates all too clearly that matters are maturing fast toward that condition when parting will be impossible. He has made himself so lovable that his very incivilities are adorable. And incivilities they are! What more incivil thing could he suggest to a votary of Philosophy than that his goddess is antiquated—that he belongs of right to ages long past, and civilizations whose sun has set, and is out of place in a country where the sun is just rising and the fullness and joy of the day is all to come?

And yet I thank him for that word. I shall connect it always with a memory which will remain extraordinarily impressive to me—of the first plea ever made for Philosophy in your new Institute. We were considering some of the things that matter most, contemplating for a brief moment some of those truths which, because they belong to the moral structure of the world, cannot come to be nor pass away, and have neither beginning nor end, but remain stable forever. The level rays of the sun, far-flung over the lonely prairie which begins from the building wherein we sat, struck through the windows of the lecture-hall, and they were saturated with the beauty of some nameless color, and carried with them far into the heart of the audience a most strange

sense of silence and tranquillity. I felt anew the truth of the word of the wise man who said that "Philosophy does not appear until some form of civilization has grown old." Then, indeed, it gathers up its meaning and treasures it for the ages still to come. So that it is to Philosophy, whether it be in the form of art or that of contemplative reason, we owe now the spiritual inspiration of the life of Israel, the natural glory of the life of Greece, and the stately civic order of the life of Rome. We did well to meet in the evening at the altar of her goddess. The owl of Minerva, the bird of wisdom, does not set forth on its flight till the twilight begins to fall.

But what is Philosophy? some of you may ask. Science we know, and Art we know, and Literature we know: to these we have dedicated our Institute; but who or what is Philosophy? I am tempted to define it just as that for which there is no provision in the Rice Institute; but I would like to add to the definition, that provision *will* be made, and more amply when the Institute matures. "You wait," said a Chicago man to a Boston man who had taunted him with sticking pigs as the only form of culture in his city—"you wait till we have stuck a few more pigs, and Chicago will make culture hum!" There have been times in the world's history, or at least in that of the most beneficent of the nations, when Philosophy, the contemplative reconstruction of experience, the converse of the human spirit with itself, by which it makes its treasures its own, was their crowning achievement and the most splendid of all their enterprises. And that time will, I believe, come yet to you in this great country.

Another definition of Philosophy has occurred to me since coming into this room, on hearing the delightful speech of Professor Emile Borel of Paris. It is the study to which

great mathematicians are prone to turn when their minds mature. Plato, the broad-browed, in whose writing poetry and philosophy, beauty and truth, mingled their pure broad streams; Aristotle, possibly the greatest sheer intellect that the world ever saw, who fixed even until this day the provinces of so many of the sciences; Descartes, the greatest philosopher that France ever knew, and the prophet of the dawn of the modern world; Spinoza, probably the most seraphic of all great thinkers; Leibnitz, one of the most many-sided; and Immanuel Kant, with whose thinking modern civilization, like a broad river striking a granite bank, has taken its last great turn—all these were amongst the greatest, if not *the* greatest mathematicians of their day.

It was entirely natural that these great, grave, reflective spirits should be led, as life advanced, to consider those problems which, as they spring from the very nature of truth, reason cannot set aside and prosper. And it was not less natural that the severity of the method of the mathematical sciences should make them strong in the service of Philosophy, where, if possible, severity of method is at once more necessary and more difficult. For Philosophy sets man to strive to comprehend the working, not merely of natural agents as the sciences do, but of the experience in which the meaning of nature in its relation to man, and of man in his relation to nature, is arrested. It deals with the finer spirit, and the final issues, for it deals with facts as embodied in the world of interrelated minds and intersecting and yet co-operating wills which civilization is. Laxity of method, tendencies toward prejudices, antipathy save to error, love except for truth, are in this region fatal. For here we are dealing with ultimate values.

A great day is coming when man shall comprehend the working of his own spirit to the degree in which the sciences

reveal the meaning of nature; though these latter are themselves, no doubt, only at the beginning of things. For Philosophy is meant to crown the work of Science, even as Man, we believe, is the consummation of the natural scheme.

Then, too, the affinity of Philosophy with Art, and especially with the Art of Poetry, will become manifest. For, in my opinion, the poet and the philosopher are very much akin. They are, as a rule, both present and in power where the history of mankind shows that new times have come to the birth. If you were to ask me who in the English-speaking world were the greatest philosophers, I should be tempted to name the poets in prose and verse, especially Carlyle, Wordsworth, and Browning.

But the night is far spent, and the theme is too great except to touch its margin. I can wish nothing better for the Rice Institute than that it may for many centuries to come be the fostering home of Art, Science, and Philosophy. You have treated me and my fellow-guests with extraordinary kindness, and if you can entertain a philosopher so well now, I have no doubt that ere long you will "entertain that stranger"—Philosophy.

PRESIDENT LOVETT: In thanking Professor Sir Henry Jones for his eloquent apology for philosophy, I venture to say that our scheme of studies has been so arranged in the belief that if philosophy and science are to go hand in hand in our day, as they did in the earlier days of human thought, it becomes more and more necessary that the student of philosophy should have considerable acquaintance with chemistry, physics, biology, and the other experimental sciences before entering upon the serious study of philosophy itself. We have among our guests the distinguished mathematical physicist of the University of Rome, whose re-

searches have ranged from the physics of the earth through the physics of the ether to the motions of the heavenly bodies themselves. I have the honor of asking Professor Senator Vito Volterra to respond for this fundamental field of knowledge, wherein pure mathematics has met with some success the problems of the physical universe.

PROFESSOR SENATOR VITO VOLTERRA: Without doubt we shall never forget the days that we have spent at Houston. I do not hesitate to call the inauguration of such an institute as this an historic event: it is one that will have consequences of great importance for culture in general. Beginning in this impressive manner, endowed with means so large, directed by men so eminent, it is sure to have a considerable influence on the development of science.

It would not fit the case exactly to speak of pure science and of applications. By giving a solid base to culture, you are certain to prepare the new generations not only to contribute to scientific progress, but also to be ready to apply the resources of science to its most useful applications.

The physical sciences, pure physics in the most general sense of the word, give the most opportune illustration of what I have just said. It is sufficient to consider the developments that have taken place in the last few years, and the influence that these developments have had on the general concept of science that the public has found for itself. In the development of physics, the most completely theoretical part, which we call mathematical physics, and the experimental part, have always progressed side by side, each an aid to the other. Some branches, indeed, that at first sight seem far remote, we observe upon closer inspection to have had considerable influence on each other.

Consider, for instance, the case of astronomy, or, more

precisely, celestial mechanics. It seems entirely theoretical and abstract. Yet from where came the concept of potential? Laplace introduces it into the subject of celestial mechanics in order to study in a simple mathematical way the laws of universal gravitation. Now little by little the idea of potential was carried from the domain of celestial mechanics to that of static electricity. After that it was introduced into electrodynamics. And, different only in form, when electricity was brought to the hands of the whole world, it was acquired by the workers in electricity and the people. In a word, potential took its point of departure in integral calculus, but is now used by everybody.

Mr. Borel spoke to us, in his fine lecture, of certain functions, very complicated and difficult to study, that appear in analysis. They are to be applied to modern physics. Let us hope that they have a future comparable with that of the potential function.

The greatest progress in physics has taken place doubtless in the subjects of electricity, optics, and the theory of heat. At first widely distinct, they have become little by little closely connected; and if a scientist of a hundred years ago should behold their modern development he would be quite surprised to perceive that optics has become a special branch of electrodynamics, and that electricity is merely one chapter in a general theory that includes as special instances the theory of gases and the conduction of heat and electricity. And finally he would notice that the theory of energy dominates all branches of natural philosophy.

According to Descartes, mechanics was the basis of all physics. It has undergone many changes, and in the view of many scientists will cease to play that principal rôle and become a special branch of energetics. According to others, it will be modified in its most fundamental laws and become

an entirely new organum, completely without the bounds of classical mechanics.

Who can tell what the future prepares for us? New marvels are quite likely to follow those which have lately startled us. Probably many of the hypotheses that now serve us usefully must fall. They constitute merely the light scaffolding by means of which we erect a great building.

Beginning to-day, I see the Rice Institute, by means of its professors and students, drawn into the scientific progress of the future. I raise a glass and drink to the future of this institute, to its glory and service in the culture of America and the world.

PRESIDENT LOVETT: We have reached the keystone of our arch. In calling for the formal toast to "Science," I beg to remind you that the spirit of this university of science has been cut in two tablets of stone on the walls of its chief building. On one of them the Greek Aristotle says, "If we properly observe celestial phenomena, we may demonstrate the laws which regulate them," and on the other the Hebrew Job says, "Speak to the earth, and it shall teach thee." It is with peculiar pleasure that we have requested Professor Conklin of Princeton University to make this response; for, as one of the members of our first advisory committee, we greet him, not as a stranger, but as one on whose counsel we leaned even before any of our aspirations had begun to assume definite or concrete form. In his double capacity as professor of biology in Princeton University and expert adviser to the Rice Institute, I have the honor of introducing to you Dr. Edwin Grant Conklin, who will speak to the toast "Science."

PROFESSOR EDWIN GRANT CONKLIN: During this academic festival we have seen everywhere, on banners and

programs, on ice-cream and cakes, the seal of the Rice Institute with its three owls. In poetry and classic lore the owl is the bird of Minerva, the symbol of wisdom, but in fact and natural history he is the bird of night, and it was not until this dinner had lasted long beyond the night's keystone that the real inner significance of this seal dawned upon me—namely the *three-owl power of the Rice Institute*.

But considering these owls on the seal as birds of wisdom, I ask you to observe their positions and names: two are on the roof or in the air, and one is in the coop or on the ground. The two in the air are labeled "Literature" and "Art," the one on the ground or in the coop is labeled "Science."

I am to speak for a kind of learning which is thought by some persons to have no wings, which "moves but slowly, slowly, creeping on from point to point"; which many consider as not only groveling, but as narrow in outlook and material in its tendencies. I wish to show that the chief debt of civilization to Science is not for material comforts, but for intellectual freedom and enlightenment; that while Science plants her feet on the solid ground of nature, she moves with her head among the stars.

The great aim of Science is to know and control nature, not merely for the purpose that man may obtain the golden touch, not that all things may be made to minister to his comfort, but rather that he may know the truth, and that the truth may set him free.

The wonderful material changes wrought by science, such as the developments of steam, electricity, and great engineering enterprises, and the consequent increase of comforts and enlargement of human experience; the remarkable growth of the applied sciences of chemistry, physics, biology,

and geology; and, perhaps most of all, the revolutionary changes in medicine, surgery, and public health which have followed a scientific study of the causes and remedies of various diseases, are liable to blind us to other great achievements of science, which, if less material, are none the less real and valuable.

1. First among all the services of science must always be reckoned its liberation of man from the bondage of superstition. We can never fully realize the terrors of a world supposed to be inhabited by demons and evil spirits, a world in which all natural phenomena are but the expressions of the love or hatred of preternatural beings. But we may gather from history and from present-day ignorance and superstition some faint idea at least of the ever present dread, even amidst happiness and joy, of those who feared Nature because they knew her not, of those to whom the heavens were full of omens and the earth of portents, of those who peopled every shadow with ghosts and evil spirits, and who saw in all sickness, pain, adversity, and calamity the cruel hand of a demon or the evil eye of a witch.

It is frequently assumed that the decline of superstition is due to the teachings of religion or to the general development of the intellectual powers of man, and there is no doubt that to a certain extent this is true. The general advance of the intellect, in so far as it is associated with truer views of Nature, is unquestionably inimical to superstition; yet the persistence of such a superstition as that concerning witchcraft through periods of great religious and intellectual awakening, the almost universal belief in it throughout the golden age of English literature, the statutes of all European countries against the practice of witchcraft, sorcery, and magic, some of which remained until the beginning of

the nineteenth century—all these things show that however religion and general intelligence may have curbed its cruel and murderous practices, its downfall could be brought about only by a more thorough knowledge of Nature. The common belief that insanity, epilepsy, and imbecility were the results of demoniacal possession necessarily led, even in enlightened and Christian communities, to cruel methods of exorcising the demon, and the final disappearance of this superstition (if it may be said to have disappeared even at the present day) is entirely due to a scientific study of the diseases in question.

The same might be said of any one of a hundred forms of superstition which, like a legion of demons, hedged about the lives of our ancestors. As false interpretations of natural phenomena, only truer interpretation could displace them; and what centuries of the best literature, philosophy, and religion had failed to do, science has accomplished. Science is, as the elder Huxley has said, organized and trained common sense; and nowhere is this better shown than in its rational, common-sense way of interpreting mysterious phenomena. No doubt much still remains to be accomplished; the unscientific world is still full of superstition as to natural phenomena, but it is superstition of a less malignant type than prevailed before the general introduction of the scientific method.

Furthermore, the cultivation of the natural sciences has done more than all other agencies to liberate man from slavish regard for authority. When all others were appealing to antiquity, the Church, the Scriptures, Science appealed to facts. She has braved the anathemas of popes and church councils, of philosophers and scholars, in her search for truth: she has freed from ecclesiastical, patristic, even academic bondage; she has unfettered the mind, enthroned

reason, taught the duty and responsibility of independent thought, and her message to mankind has ever been the message of intellectual enlightenment and liberty: "Ye shall know the truth, and the truth shall make you free."

2. But Science has not only broken the chains of superstition and proclaimed intellectual emancipation: she has *enormously enlarged the field of thought*. She has given men nobler and grander conceptions of nature than were ever dreamed of before. Contrast the old geocentric theory, which made the earth the center of all created things, with the revelations of modern astronomy as to the enormous sizes, distances, and velocities of the heavenly bodies; contrast the old view that the earth was made about six thousand years ago—5670 years last September, to be exact—in six literal days, with the revelations of geology that the earth is immeasurably old, and that not days but millions of years have been consumed in its making; contrast the doctrine of creation which taught that the world, and all that therein is, recently and miraculously were launched into existence, with the revelations of science that animals and plants and the world itself are the result of an immensely long process of evolution. As Darwin so beautifully says, "There is grandeur in this view of life with its several powers having been breathed by the Creator into a few forms or into one, and that whilst this planet has gone cycling on according to the first law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been and are being evolved." There is grandeur in the revelations of science concerning the whole of nature,—grandeur not only in the conceptions of immensity which it discloses, but also of the stability of nature. To the man of science nature does not represent the mere caprice of God or devil, to be lightly altered for a child's whim. Nature is, as Bishop Butler says,

that which is stated, fixed, settled, eternal process moving on, the same yesterday, to-day, and forever. Men may come and men may go, doctrines may rise and disappear, states may flourish and decay, but in nature, as in God himself, there is neither variability nor shadow of turning. The all too prevalent notion that nature may be wheedled, cheated, juggled with, shows that men have not yet begun to realize the stability of nature, and indicates the necessity of at least some elementary scientific training for all men. "To the solid ground of Nature trusts the mind that builds for aye."

3. Science has changed our whole point of view as to nature and man, and science cannot therefore be eliminated from any system of education which strives to impart culture. It is not principally nor primarily in its results, however great they may be, that the chief service of science is found, but rather in its method. In a word, the method of science is the appeal to phenomena, the appeal to nature. To the scientist the test of truth is not logic, nor inner conviction, nor conceivability and inconceivability, but phenomena, or what are commonly called facts. The steps of this appeal to phenomena are first observation or experiment; then induction, hypothesis, or generalization; and finally verification by further observations, experiments, and comparisons. The methods of science have now invaded to a greater or less extent all domains of thought,—philosophy, literature, art, education, and religion,—and the unique character of the method of science may not be fully appreciated except upon comparison with pre-scientific or non-scientific methods.

Of course one need not expect to find any proper appreciation of the scientific method among the ignorant, but it is amazing how such appreciation is lacking among many

otherwise intelligent and cultivated people. We daily see innumerable cases where the test of truth is the appeal to superstition, to sentiment, to prejudice, to inner conviction—in short, to anything rather than facts.

Consider for a moment the art of healing, as contrasted with the science of medicine; the various “schools of medicine,” and much more those who never went to school, appeal not to carefully determined, accurately controllable phenomena, but largely to sentiment, prejudice, and superstition. The same is true of the “fake” science which flourishes mightily in the daily papers, and especially is it shown in the hypotheses, discoveries, and dogmas of those who determine the laws of nature from introspection and construct the universe from their inner consciousness.

Every little while there arises a new and brilliant Lucifer who draws after him a third part of the hosts of heaven. Though he appears under many guises, such as divine healer, Christian Scientist (Heaven save the mark!), spiritualist, theosophist, telepathist, the main tenet of his belief is always the same—a revolt against the scientific method of appealing to phenomena.

What is the remedy for such a state of affairs? A little first-hand knowledge of scientific methods. The appeal to facts is the very foundation of science, and it is a method in which every person, and particularly every student, should receive thorough and systematic training.

To me it seems that there is no part of an education so important as this, none the lack of which will so seriously mar the whole life. Of course it is not claimed that all scientists best illustrate the scientific method, nor that it may not be practised by those who have not studied science, but that this method is best inculcated in the study of the natural sciences. Science not only appeals to facts, but it cultivates

a love of truth, not merely of the sentimental sort, but such as leads men to long-continued and laborious research; it trains the critical judgment as to evidence; it gives man truer views of himself and of the world in which he lives, and it therefore furnishes, as I believe, the best possible foundation, not only for scholarship in any field, but for citizenship and general culture.

But culture is not some definite goal to be reached by a single kind of discipline. There is no single path to culture, and the great danger which confronts the student of the natural sciences is that his absorption in his work may lead to a narrowness which blinds him to the broad significance of the facts with which he deals and unfits him for association with his fellow-men. A technical education which deals only with training for special work, without reference to foundation principles, may be useful and necessary, but it cannot be said to contribute largely to culture. What teacher has not been surprised and pained by the fear which some students exhibit that they may waste an hour on some subject the direct financial value of which they do not see,—students who fail to grasp general principles, to take a broad and generous view of life, to appreciate good work wherever done? The scientist no less than the classicist or the humanist should know the world's best thought and life. Life is not only knowing but feeling and doing also, and other things than science are necessary to culture. The day is forever past when any one mind can master all sciences, much less all knowledge; there can never be another Aristotle or Humboldt; nevertheless, in the demand for broad and liberal training the greatest needs of scientific work and the highest ideals of culture are at one, and this Institute can serve no more useful purpose than to stand for the highest, broadest, and most generous views of science, of education, and of life.

PRESIDENT LOVETT: If the manifold ramifications of the modern spirit of research and scientific inquiry have resulted in a corresponding multiplication of the sciences, that same method is constantly striving through their mutual relations to restore to science its unity. Physics and biology, the fundamental sciences of the inorganic and the organic world, respectively, find a meeting-ground in chemistry. Chemistry stands out in the history of science with as romantic a background as is that possessed by astronomy. The one began in astrology and the desire of man to read his fate in the stars; the other began in an alchemy which reflected a corresponding desire to find the fortune of gold in all the baser elements of earth. Professor Sir William Ramsay, in his inaugural lecture this morning, showed us how he has been bringing all that romance within reach of realization. He has consented to respond still further for Chemistry this evening.

PROFESSOR SIR WILLIAM RAMSAY: I did not know anything was expected of me to-night, and I will not disappoint you if at this very late hour of the night I suggest that speech should be extremely brief.

The subject of chemistry is a very large one, and if I were to try to explain it to you, I think I should have to treat you to an account of what has been accomplished by all chemical students. If you are prepared to listen, I shall be delighted to go on; and, if you like, I can begin with the beginning of chemistry and lead you straight through the old and modern history of chemistry.

Chemistry plays a considerable part in the welfare of mankind, and, as the last speaker has said, the scientific man regards it from the point of view of curiosity to know how the little wheels go round. I have always had such curiosity;

but I think I may speak for every true man of science who takes the trouble to investigate nature, if I say that women ought to be the best chemists; for Eve was the first and most curious of God's creatures.

It is said to be owing to her action that the state of affairs which we see around us now was produced; and possibly, in the days of the future—the time when men have been excluded from the vote, and when the country is ruled by women—the courage which is inherent in success will again appear. I remember a saying which struck me at the time as very true, and by no means discourteous to women; it is, that women take more interest in persons, while men are more interested in things.

I am sure that you will find that there are few women who devote themselves to any source or branch of knowledge, except for the love of some man whom they elect to follow. As for us men, we shall continue the researches with as much vigor as we have up to now bestowed upon them. We are continually approaching a goal which can never be reached; and it is as well that it is unattainable, for it would be selfish in us to wish to find out everything and leave nothing for our successors. That is impossible; the world of knowledge is illimitable, and no words are available to express its infinite extent. Newton, the great natural philosopher, said once that we are all like children on the sea-shore, picking up here and there a pebble, while the vast ocean of knowledge is spread at our feet. We are lucky if we find pebbles; those of us who try pick up small and not very valuable stones for the most part.

The work of the man of science is in some degree creative; and I say that this spirit of creation is not confined to the scientific man, but is common to the artist, to the man of letters, and even to the philosopher. It is the spirit which

impels us forward on the road which we must travel, and the great pleasure of those of us who feel in that way must be to induce others to travel along the same road. There is no greater pleasure than to see one's disciples succeed, no greater pleasure than to feel that they are pushing along the road which leads to victory, and doing something for the ultimate happiness and benefit of the human race.

PRESIDENT LOVETT: When the history of the nineteenth century comes to be written, it is doubtful whether that century will stand out more prominently as a century of science or a century of history. From some points of view, the history of historians in the nineteenth century is almost as fertile in ideas as is the history of scientists in that same period. If history has been assuming more and more the characteristics of a science, it should nevertheless be losing none of its character as an art. If history has become a subject of scientific research, not in laboratories but in archives and excavations, it still must be more than chronology, more than critical survey and systematization of sources; for to be great, as the father of history made it great, it still must be great as literature. Those of you who listened to the eloquent lecture of Professor Altamira this morning will welcome him again heartily to-night as an able exponent of this double aspect of history.

PROFESSOR RAFAEL ALTAMIRA: I should like nothing better than to undertake an apology for historical studies in the same fashion as I have seen my colleagues to-night present apologies for other scientific fields, but I find that the night is too far spent to engage myself in the arguments and explications which in the face of the vulgar skepticism concerning the subject of history refuse to be summarized either readily

or succinctly. I prefer, therefore, to limit the representation of my studies on this occasion to recalling an historic event which most naturally jumps to mind at this time. Ladies and gentlemen, it is just past midnight. The eleventh of October gone, we have arrived at the unforgettable date of the twelfth of October; that is to say, we have come to the day on which, four hundred and twenty years ago, Christopher Columbus with his Spanish boats and sailors arrived at the first of the American countries to become adequately known to Europeans. This event, which had quite another object than that of discovering a new world, was nevertheless the cause of a great change, by which the old continent of Europe, distressed by profound crises of conscience, yet illuminated by the light of the Renaissance of learning and scientific discovery, renewed history by passing from the régime of simple commerce with people anthropologically different from themselves to that of the emigration and the founding of new nationalities from the same stock.

Permit me to recall that to Spain belongs the glory of having promoted this new era in human life, and of having sent forth the first elements of population and European civilization to America. Any consideration of the processes which have been necessary to change the America of the fifteenth and sixteenth centuries into the America of the twentieth century, so full of lessons for human psychology and human education, is of itself sufficient to justify the importance of historical studies. Nowhere in the whole sphere of human knowledge could a man find a subject more worthy of study and reflection. But this is not the moment to enter upon such a study. I can do no more than recall to your thought Christopher Columbus and his companions, and ask you to think of them with thoughts full of appreciation and admiration. This Spain of which they were a part, and

which is forever linked by them to America, says to you through my voice at this solemn hour for Houston:

"*Viva el Instituto Rice!*" ("A long life to the Rice Institute!")

A more sincere toast, or one fuller of meaning, I know not how to utter.

PRESIDENT LOVETT: Comparable with the wealth that followed in the wake of the memorable expedition of the illustrious Christopher Columbus in the *Santa Maria*, the *Niña*, and the *Pinta*, to which Professor Altamira has so pertinently alluded, is the wealth to human thought that Charles Darwin brought back from a similar voyage of discovery made in the *Beagle* some three hundred years later. I should hesitate to place letters, philosophy, history, and art in anything approximating a logical sequence; but in arranging the order of responses I had no hesitation in placing mathematics, physics, chemistry, and biology in the order in which their representatives appear here to-night, for mathematics is indispensable to the physicist, mathematics and physics to the chemist, and mathematics, physics, and chemistry to the biologist. Thus we have in biology a crown of the sciences. To make this crowning response for science I have great pleasure in calling upon Professor Hugo de Vries of the University of Amsterdam, whom others, much more competent to speak than I, have characterized as the lineal successor of the illustrious Charles Darwin.

PROFESSOR HUGO DE VRIES: It is with great satisfaction that we have seen the foundation of this new Institute. No country has such a large number of universities on so small a tract of land as has my native country—Holland. Nowhere are the relations between science and practice so intimate as with us, and nowhere is the influence of research work

and teaching on the education of the people and on the increase of wealth and prosperity more evident than with us. Therefore I cordially sympathize with your work, and think that the best thing William Marsh Rice could have done for his beloved Texas was the foundation of a center of education and learning, which should gradually become a constantly increasing source of evolution on the highest lines. The Southern States want to show to all civilized nations that they are evolving on the same broad lines, and have the means and the will of rivaling them in all those things on which the progress of civilization depends. William Marsh Rice has incorporated this idea in the form of an institution of learning, and the trustees of his foundation have developed it to the high standing of a young university.

I esteem it a favor to express my sincere thanks to the trustees and the president for the kind hospitality I have enjoyed as their guest. I am very glad to be present here and to have the distinguished honor of participating in the dedication of the Rice Institute.

In the play of "Hamlet," Shakspere says: "There are more things in heaven and earth than are dreamt of in our philosophy." It is the task of science mainly to find out all these things in heaven and on earth which are still unknown to us, and there are so many of them that we want collaborators all over the earth. We want from you collaboration; and from the things I have seen to-day in the beginning of this young Institute, I may predict a proud future in scientific research as well as in educational work.

Such a proud future I may predict, and heartily wish it to the president and Board of Trustees of this great Institute, which has been made possible by the money of William Marsh Rice and the brain of Edgar Odell Lovett.

I drink to the prosperity of the Rice Institute.

PROFESSOR SIR WILLIAM RAMSAY: I don't know whether the ceremony is ended or not, but there is one thing we ought all do to-night, and that is drink to the health of your president, Edgar Odell Lovett.

At this late hour it is obviously not expedient to make a long oration in which his many virtues should be chronicled; but you will all agree with me that it is our duty, as well as our great pleasure, to thank him, before we part, for all his kindness to us; to congratulate him on the magnificent success of these celebrations, for which he has so arduously prepared; and to wish him and Mrs. Lovett many long and happy years in which to enjoy their life at this Institute, the inauguration of which has been so happily completed.

PRESIDENT LOVETT: I should indeed be short in human feeling were I not deeply touched by your generous response to Professor Sir William Ramsay's gracious suggestion. But, ladies and gentlemen, it is the man I am now about to introduce to you that you should have toasted and cheered, for it is to the genius of his constructive imagination that we owe all the beauty of this place. The appeal of these beautiful buildings is his appeal—an appeal that places beauty of art alongside of beauty of truth and beauty of holiness. In the walls of the first of these monuments which he conjured from the civilizations of southern climes we have caused to be carved: "The chief function of art is to make gentle the life of the world," and "The thing that one says well goes forth with a voice unto everlasting." The things that Mr. Cram has wrought so well we have builded in brick and bronze and marble, in the hope that they may endure unto days everlasting. I have the honor of introducing to you the architect of the Rice Institute, who will respond for "Art."

DR. RALPH ADAMS CRAM: After what fashion shall I, follower of art in a sense, speak on this debatable subject, here at the inauguration of a great institution of culture and learning, and before you, its earliest and forever most honored guests, who, personally and officially representing Church, State and School, here and now pay tribute to that great power whose duty it is to lead onward and forward every child born of man, until, man at last, he is worthy to play his part in the life that opens before him of service and charity and righteousness and worship?

I might speak of art historically, as the perfect flowering of sequent epochs of civilization, as the evanescent record of man's power of great achievement, as a glory of history in Homer and Phidias, in Virgil and Arthemius of Tralles, in Ambrosian chant and Gregorian plain-song, in the Arthurian legends and the Nibelungenlied, in Adam of St. Victor and Dante, in Cimabue and Giotto and their great successors; in the cathedrals and abbeys of medievalism, in the sculptures of Pisa and Paris and Amiens, in Catholic ceremonial, in the glass of Chartres, the tapestries of Flanders, the metal-work of Spain; in the drama of Marlowe and Shakspeare, in the music of modern Germany, in the verse of the English Victorians. I might speak of art as an ornament and amenity of life, a splendid vesture covering the nakedness of society. I might speak of it in its economic aspect, or as the handmaid and exponent of religion.

Art is so great a thing, so inalienably a heritage and a natural right of man, it has all these aspects, and more, but for the moment I narrow myself to yet another consideration—the function of art as an essential in education.

The adjective may strike you strangely—an essential element—not an accessory, an extension; but I use it with intention, though to justify such use I must hasten to disavow

any reference to the teaching of art as this now obtains either in art-schools or under university faculties of fine arts. It is, I admit, hard to conceive such teaching as being of necessity an integral part of any scheme of general education, however efficient it may be when viewed in the light of its own self-determined ends, and I should expect from no source endorsement of any argument for the universal necessity of an art education conceived on similar lines; but I plead for a higher, or at least broader, type of such teaching, because I try to place myself amongst those who set a higher estimate on art, conceiving it to be not an applied science or a branch of industrial training, nor yet an extreme refinement of culture study, but simply an indispensable means toward the achievement of that which is the end and object of education—namely, the building of character.

There were days, and I think they were very bad old days, when it was held that education should take no cognizance whatever of character, of the making of sane, sound, honorable men and women, but only of mental training and mental discipline. Then it was said with grave assurance that it was not the province of public education to deal with religion, ethics, or morals, except from a strictly historical and conscientiously non-sectarian standpoint, and that the place for the teaching of these things was the Home—spelled with very large capitals. After a while the compulsion of events forced a readjustment of judgments and we became conscious of the fact that a combination of influences—amongst them our very schools themselves—had resulted in the production of homes where neither religion nor ethics was taught at all, and where conscious character-building was of the most superficial nature, while the concrete results were somewhat perilous to society. Struck at last by the fact that our most dangerous criminal classes

were made up of those who were extremely well educated, we were compelled, as Walt Whitman says, "to re-examine philosophies and religions," and some of us came to the conclusion that if the schools were to save the day, as they certainly must and certainly could, a new vision was necessary, and that what they were set to do was the bending of all their energies and powers toward character-building, toward the making, not only of specialists, but of fine men and women and good citizens.

Under the old system the significance of art and the part it could play in education were generally ignored; it was treated either as an "extra," as a special study like Egyptology or Anglo-Saxon, and so regarded as the somewhat effeminate affectation of the dilettante, or as a "vocational course," ranking so with mining engineering, dentistry, and business science. So taught, it was indeed no essential element in general education; but if we are right in our new view of the province thereof, it may be that our old estimate of art and its function and its significance needs as drastic a revision, and that out of this may come a new method for the teaching of art.

What is it, then,—this strange thing that has accompanied man's development through all history, always by his side, as faithful a servant and companion as the horse or the dog, as inseparable from him as religion itself; this baffling potentiality that has left us authentic historical records where written history is silent, and where tradition darkens its guiding light? Is it simply a collection of crafts like hunting and husbandry, commerce and war? Is it a pastime, the industry of the idle, the amusement of the rich? None of these, I venture to assert, but rather the visible record of all that is noblest in man, the enduring proof of the divine nature that is the breath of his nostrils.

Henri Bergson says, in speaking of what he calls—inadequately, I think—intuition: “It glimmers wherever a vital instinct is at stake. On our personality, on our liberty, on the place we occupy in the whole of nature, on our origin, and perhaps also on our destiny, it throws a light, feeble and vacillating, but which nevertheless pierces the darkness of the night in which the intellect leaves us.” Here lies the province of art, where it has ever lain; for in all its manifestations, whether as architecture, painting, sculpture, drama, poetry, or ritual, it is the only visible and concrete expression of this mystical power in man which is greater than physical force, greater than physical mind, whether with M. Bergson we call it intuition, or with the old Christian philosophers we call it the immortal soul.

And as the greatest of modern philosophers has curbed the intellectualism of the nineteenth century, setting metes and bounds to the province of the mind, so he indicates again the great spiritual domain into which man penetrates by his divine nature, that domain revealed to Plato and Plotinus, to Hugh of St. Victor and St. Bernard and St. Thomas Aquinas. As Browning wrote, “A man’s reach must exceed his grasp, or what is a heaven for?”—so, as man himself, transcending the limitations of his intellect, reaches out from the world of phenomena to that of the noumenon, as he forsakes the accidents to lay hold on the substance, he finds to his wonder and amazement the possibility of achievement, or at least of approximation, and simultaneously the overwhelming necessity for self-expression. He has entered into a consciousness that is above consciousness. Words and mental concepts fail, fall short, misrepresent; for again, as M. Bergson says, “The intellect is characterized by a natural inability to comprehend life,” and it is life itself he now sees face to face, not the inertia of material things; and it is

here that art in all its varied forms enters in as a more mobile and adequate form of self-expression, since it is, in its highest estate, the symbolic expression of otherwise inexpressible ideas.

Through art, then, we come to the revelation of the highest that man has achieved; not in conduct, not in mentality, not in his contest with the forces of nature, but in the things that rank even higher than these—in spiritual emancipation and an apprehension of the absolute, the unconditioned. The most perfect plexus of perfected arts the world has ever known was such a cathedral as Chartres, before its choir was defiled by the noxious horrors of the eighteenth century; when its gray walls were hung with storied tapestries, its dim vaults echoed to solemn Gregorians instead of operatic futilities, and the splendid and dramatic ceremonial of medieval Catholicism made visible the poignant religion of a Christian people. And in this amazing revelation of consummate art, music was more than “a concord of sweet sounds,” painting and sculpture more than the counterfeit presentment of defective nature, architecture more than ingenious masonry; through these and all the other assembled arts radiated, like the colored fires through the jeweled windows above, awe, wonder, and worship of men who had seen some faint adumbration of the Beatific Vision and who called aloud to their fellows, in the universal language of art, the glad tidings of great joy, that by art man might achieve, and through art he might reveal.

Now if art is indeed all this—and the proof lies clear in itself—then its place in liberal education becomes manifest and its claims incontestable. If education is the eduction of all that is best in man, the making possible the realization of all his potentialities, the building up of personality through the dynamic force of the assembled achievements

of the human race throughout history, and all toward the end of perfecting sane and righteous and honorable character, then must you make art, so understood and so taught, as integral a part of your curriculum as physics or mathematics or biology. Not in dynastic mutations, not in the red records of war, not in economic vacillations or in mechanical achievements, lies the revelation of man in his highest and noblest estate, but in those spiritual adventures, those strivings after the unattainable, those emancipations of the human soul from the hindrance of the material form, which mark the highest points of his rise, presage his final victory, and are recorded and revealed in the art which is their voicing.

The Venus of Melos, "Antigone," Aya Sophia, Gregorian music, Latin hymnology, the "Divina Commedia," Giotto's Arena Chapel, Chartres, Westminster Abbey, "Hamlet," Goethe's "Faust," "Parsifal," "Abt Vogler," are all great art, and as great art beyond price, but greater, more significant by far as living indications of what man may be when he plays his full part in God's cosmogony.

Where is art taught in this sense and to this end? I confess I do not know. Instead we find in many places laboratories of art-industry, where, after one fashion or another, ambitious youth—and not always well advised—is shown how to spread paint on canvas; how to pat mud into some quaint resemblance to human and zoölogical forms; how to produce the voice in singing; how to manipulate the fingers in uneven contest with ingenious musical instruments; how to assemble lines and washes on Whatman paper so that an alien mason may translate them, with as little violence as possible, into terms of brick and stone, or plaster and papier-mâché. And we find names, dates, sequences of artists taught from text-books, and sources and influences taught

from fertile imaginations, together with erudite schemes and plots of authorship and attribution., but where shall we find the philosophy, the rationale of art inculcated as an elemental portion of the history of man and of his civilization?

Categories, always categories; and we delimit them to our own undoing. There have been historians who have compiled histories with no knowledge of art and with scant reference to its existence; there have been artists who have taught art with no knowledge of history and with some degree of contempt for its pretensions: yet the two are one, and neither, from an educational standpoint, is wholly intelligible without the other. It is through Homer and Æschylus that we understand Hellas; through Aya Sophia that we understand Byzantium; through Gothic art that we know medievalism; through St. Peter's and Guido Reni that the final goal of the Renaissance is revealed to us. And so, on the other hand, what, for example, is the art of the Middle Ages if we know nothing of the burgeoning life that burst into this splendid flowering? What are the cathedral-builders to us, and the myriad artists allied with them, when severed from monasticism, the Catholic revival, the Crusades, feudalism, the guilds and communes, the sacramental philosophy of Hugh of St. Victor, and the scholastic philosophy of St. Thomas Aquinas? We build our little categorical box-stalls and herd history in one, art in another, religion in a third, philosophy in a fourth, and so on, until we have built a labyrinth of little cells, hermetically sealed and securely insulated; and then we wonder that our own civilization is of the same sort, and that over us hangs the threat of an ultimate bursting forth of imprisoned and antagonistic forces, with chaos and anarchy as the predicted end.

Again we approach one of those great moments of readjustment when much that has been perishes and much that

was not comes into being; one of those nodes that, at five-hundred-year intervals, mark the vast vibration of history. For five centuries the tendencies set in motion by the Renaissance have had full sway; and as the great epoch of medievalism ended at last in a decadence that was inevitable, so is it with our era, called "of enlightenment," the essence of which is analysis as the essence of that was synthesis. As medievalism was centripetal, so is modernism centrifugal, and disintegration follows on faster and ever faster. Even now, however, the falling wave meets in its plunge and foam the rising wave that bears on its smooth, resistless surge the promise and potency of a new epoch, nobler than the last, and again synthetic, creative, centripetal.

No longer is it possible for us to sever being into its component parts and look for life in each moiety; for us, and for our successors, is the building up of a new synthesis, the new vision of life as a whole, where no more are we interested in isolating religion, politics, education, industry, art, like so many curious fever-germs, but where once more we realize that the potency of each lies, not in its own distinctive characteristics, but in the interplay of all.

And with this vision we return to the consciousness that all great art is a light to lighten the darkness of mere activity, that at the same time it achieves and reveals. So, as art shows forth man's transfiguration, does it also serve as a gloss on his actions, revealing that which was hid, illuminating that which was obscure.

So estimated and so inculcated, art becomes, not an accessory, but an essential, and as such it must be made an integral portion of every scheme of higher education. A college can well do without a school of architecture, or music, or painting, or drama, and the world will perhaps be none the poorer; but it cannot do without the best of every art in

its material form, and in the cultural influences it brings to bear upon those committed to its charge, nor can it play its full part in their training and the development of their character unless, out of the history of art, it builds a philosophy of art that is not for the embellishment of the specialist, but for *all*.

"Man is the measure of all things," said Protagoras; and with equal truth we can say, Art is the measure of man.

PRESIDENT LOVETT: It is with sincere regret that I bring this meeting to a close. We have listened to philosopher, poet, historian, and architect, to biologist, chemist, physicist, and mathematician, and while we may neither point to the rooms in which Newton lived, as the Cambridge don may do at Trinity College, nor to the laboratories where Pasteur wrought, as may the doctors of Paris, yet from this night forth we shall forever be able to say that at this high table of the first Residential College of the Rice Institute, Altamira, Borel, Conklin, Cram, de Vries, Jones, Ramsay, van Dyke, and Volterra broke bread with us, and spoke to us of the things of beauty and truth that freemen hold dearer than life itself. For them and for you, sound slumber and sweet dreams for the night; and for the morrow, in the words of Kipling, "What all men desire—enough work to do and strength enough to do that work." And as a final favor I am going to ask Professors Sir Henry Jones and Sir William Ramsay to lead us in singing, "Should auld acquaintance be forgot."

LUNCHEON AT THE INSTITUTE COMMONS —CONGRATULATORY GREETINGS

'PRESIDENT LOVETT: *Ladies and Gentlemen*—The trustees of the Rice Institute honored themselves and the new university by addressing to the universities and learned societies of the world invitations to participate in this our first academic festival. Many of these institutions are represented here to-day in the person of their president, professors, or distinguished alumni. Hundreds of others have sent us cordial addresses of congratulation, and in addition to these formal messages many telegrams and cablegrams have been received this morning. In number and significance these responses have far exceeded our best expectations of courtesy and good will. To receive all these communications with proper ceremonies it would be literally necessary for this academic assembly to sit for at least another three days. In the midst of such an embarrassment of riches we have been obliged to restrict this part of our program to a few responses from representatives of the representatives. Accordingly, we have asked one of our distinguished guests from abroad to speak for the foreign and American learned societies that have sent us greetings on this occasion, and another eminent guest from Europe to speak for the foreign universities, and for the universities of America we shall call upon a delegate from one of the oldest endowed institutions of the East, the representative of one of the earliest State universities in the South, the president of one of the newer endowed universities of the North, and the president of one of the younger State universities of the West.

On the part of foreign and American learned societies, Professor Sir William Ramsay, of the University of London.

For the foreign universities, Professor Emile Borel, of the University of Paris.

On behalf of the American institutions of the East, Dean William Francis Magie, of Princeton University.

For the universities of the South, Professor William Holding Echols, of the University of Virginia.

On behalf of the universities of the North, President Harry Pratt Judson, of the University of Chicago.

For the American universities of the West, President Sidney Edward Mezes, of the University of Texas.

I have great pleasure in calling on these gentlemen, who have very kindly consented to address you, according to the program.

PROFESSOR SIR WILLIAM RAMSAY: *Mr. President, Ladies and Gentlemen*—We have witnessed within the last couple of days a birth, and there is one class of persons in this world which represents and is attendant upon births all over the world. This person is what is called in French the “sage-femme.” She is represented here by the wise men who have joined in conveying congratulations to this University on the occasion of its birth.

Personally I am the conveyor of congratulations from the University of London, from University College, London, and from the American Philosophical Society, and in the name of these three institutions I am here to wish a very long life and great prosperity to this newly born child.

I have in my hand a number of cablegrams from learned societies in every part of the world. From Kief, Moscow, and St. Petersburg in Russia, from Berlin and Göttingen in

Germany, from Bucharest in Rumania, from Copenhagen in Denmark, from Christiania in Norway, from Stockholm in Sweden, from Lemberg in Poland, from Rome in Italy, and from many other points of the compass congratulatory telegraphic messages have been sent. Besides these telegraphic good wishes which have been received this morning, there have been received from practically every literary and scientific center of the world formal addresses of felicitation and good will.

And so I am here to say that the fame of this institution has been spread broadcast to the uttermost parts of the world, and I am here to convey in their names—the names of the institutions and colleges which I have mentioned—to this newly born institution, their most hearty congratulations and their wishes for a long and successful life.

PROFESSOR EMILE BOREL: *Mr. President, Ladies and Gentlemen*—I have been commissioned to bring to the inauguration of your great and beautiful Institute the best wishes of the University of Paris and those of the Ecole Polytechnique. Besides the official messages of my mission, I desire to express to you also my warm personal appreciation of your cordial hospitality, which we can never forget, and also my great admiration for the university which you are founding. On my return to France I shall often recall the beautiful architecture of your Administration Building and the harmonious aspect of this large hall, with its decorations of flags. I am deeply touched to find, at so great a distance from our ancient Europe, a desire for work and for service animating your students altogether similar to the desire which animates ours in our faculties, in our schools. I am conscious here of the fraternity which unites men, in spite of the seas, in the same objects of research, of development, of progress.

Your organization, so eminently practical, your plans of work, so thoroughly studied, give promise of brilliant results. You have chosen some eminent professors. It is with complete confidence in the future that in the name of the University of Paris, in the name of the Ecole Polytechnique, and in my own name, I drink to your future success.

DEAN WILLIAM F. MAGIE. *Mr. President, Ladies and Gentlemen*—It is with feelings of pride and pleasure that I appear before you to-day as the representative of the Eastern Universities of the United States. In their name I bring to President Lovett and to the trustees of the Rice Institute the cordial congratulations of these institutions. They all join in welcoming to the number of the educational influences by which science and art are to be advanced in our country, an institution which takes its place among them with such flattering prospects of a great future.

Particularly, however, I appear to speak for Princeton University, in which President Lovett was for many years one of our most honored and best beloved colleagues. I shall not read the formal address with which I was furnished by the authorities of Princeton University, but I shall give expression in a more informal way to that which I believe no other institution can bring in so full a measure, the cordial and personal good wishes and congratulations of your president's intimate friends. We all remember him with affection. We all felt the deepest regrets when he left us, and we now can only express to him our sincere good wishes for the greatest possible success in his new and distinguished position.

Our president, who signed the formal letter of congratulation, of course also sent his warmest personal congratulations. I shall not attempt to enumerate at this time those of

President Lovett's Princeton friends who wished to be personally and by name joined with our president in these congratulations, but I am sure that you will be pleased to hear that I bring to President Lovett and to the Rice Institute the congratulations of a woman who is known and honored throughout the land—Mrs. Grover Cleveland.

I would like to say just a word or two besides these words of congratulation, and explain why I wish to congratulate so particularly your president and your institution.

I will first say a word on the subject which has just been referred to in the eloquent address of the representative of the University of Paris, when he spoke about the beautiful architecture of the buildings which are going up on this great campus. I feel that on this occasion it would not be right if we did not give full and hearty recognition—and I am glad to say that this has already been done in better words than I could possibly use—to the wonderful artistic success which has been attained already, and which you can, I think, expect to be attained in the future development of the institution under the guidance of your supervising architect, Mr. Cram. I had the peculiar pleasure of going about with him while he inspected the buildings. He saw them in their completed form for the first time, and I never appreciated so well as I now do, after seeing his delight in his own achievements, what is meant by the words, "And God saw everything that He had made, and behold, it was very good." I congratulate you most heartily on having Mr. Cram as the supervising architect of this Institute.

Then again, in line with what was presented in the speech of the Bishop of Tennessee and in the address of your president, I congratulate you upon the declared devotion of this Institute to science, literature, and art, in their pure form, as preliminary to the development of the technical sciences

and arts which contribute so much to the comfort and pleasure of the world. I do not feel that, after what was said this morning, I need repeat the reasons why pure science is particularly important in an institution which is to be devoted partly to the solution of technical problems. All the great inventions grew out of scientific discoveries. I could give you example after example, and every other scientific man here could do the same, but I cannot stop for it. The pure sciences furnish the ideas which are developed in practice. They give the student the necessary theoretical foundation for his practice and make it possible for him to be more than a mere drudge in the technical applications of the sciences. Chesterton says, somewhere, that if a machine stops because a nut comes off, or a tire is punctured, an ordinary mechanic can put it in order; but if some real trouble happens and the machine really breaks down, it is far more likely that it will be put in order again, not by a mechanic, but by some white-haired professor who seems to have very little practical knowledge, but who has been trained by his theoretical studies to get to the bottom of the trouble and so to remedy it. Besides all this, the study of pure science stimulates research, and it is to scientific research that we owe the most striking development of the modern mind, and it is to research carried on by men trained in such institutions as this that we are to look for the advancement of knowledge in the future. I congratulate this institution that, in spite of the temptation to found and develop a purely technical school, the other course has been taken and an institution has been established in which the technical arts and sciences will spring, as they ought to do, from a thorough foundation in theory; and I again extend to the president our congratulations on the purposes and noble aims of this Institute, and our best wishes that these will develop into full fruition.

PROFESSOR WILLIAM HOLDING ECHOLS: *The Trustees of Rice Institute, Mr. President, my Colleagues, Ladies and Gentlemen present*—It is somewhat fitting that he who brings Virginia's greetings to you should be a Southerner, and, as it happens, in a sense a Texan, since he was born in San Antonio.

I bear a message from the oldest Southern State to the youngest and most powerful of these States.

In old Virginia on the east, in younger Texas on the west, and in all that land which lies between them without a break, live the most homogeneous people of one blood in all these United States.

It is somewhat difficult at times for others to understand why we Southern people love so intensely the soil into which our blood has gone and out of which our blood has come, the deep affection and the swift understanding which we have in one another, the mutual dependence and trust with which we lean upon each other.

For forty years the energy of the South has been absorbed in striving to satisfy the craving of the primitive belly-need of a wrecked people.

During that period there was scant time among her sons for what is called education, there were small means for them for what is called culture.

Let there be no mistake when one says the South is uneducated, lest by that one means the South is ignorant. This Southern generation knows that it has been hewing wood, drawing water; that it has made its bricks without the straw, but steadfastly, quietly reconstructing, rehabilitating *ab initio*.

The South knows, and she has known it all along, that her people are coming into their own inheritance again. A suspicion of this is even now felt beyond her borders.

The South has now passed through those dark days of feeding mouths and clothing bodies after devastation. She has not time, even as yet, for the gentler things of literature, music, and art. But she has come to the day when no longer shall she bear the transit, run the level, and drag the chain of an alien industry in the exploitation of her own resources.

It is of intensely human interest to reflect that, in one generation after the bitterest and most fratricidal war the world has known, much of the means for the highest rehabilitation of her people has come from the personal kindness and friendly generosity of a one-time foe.

Your splendid endowment has come from one initially across the line. Also to Virginia has come from a similar source, for a similar purpose, more than a million of dollars; and so it was with Vanderbilt University, the Peabody funds, and many others. He who writes the history of this people cannot ignore these deep-rooting influences.

Here to Texas, the youngest of these States, has come this golden opportunity, this great responsibility and sacred trust. It is within your power to respond to the great and crying need of a people near and dear to you. Yours is the exalted privilege and sacred duty to breed for that people leaders of men, leaders of industry, and leaders of thought; men trained to depend upon the solidity of scientific truth, with minds so philosophically trained that they may organize the present and with far-reaching insight design the future; men so prepared that they may enter the lists to claim and hold for the South her people's share in their birthright of her natural resources.

The South is potentially the richest part of the United States, and we are the legitimate heirs of her treasures.

It is only through the minds of men splendidly trained in technology and the laboratory, transmitting energy for the

transmutation of the raw products of mine and soil through furnace and mill into the finished detail, that we can hope to hold that which has been bequeathed to us.

Yours is the function to generate these men. Smaller institutions can supply the rank and file, but yours is the opportunity, the ability, and the solemn duty to carry forward this high mission of making high men, keeping ever in mind that it is the knowledge of the truth that makes men free.

There can be no need to fear for the coming of literature, music, and art to a sensitive and imaginative people. These things will come as naturally in their proper order as does the rising sun, after the sterner diet of which I speak. Food and clothing, then possession and power—after them, as always, the Muses come.

To you gentlemen of the Board of Trustees of the Rice Institute the University of Virginia bids me present her heartfelt congratulations upon the good fortune of your opportunity, upon the far-sighted largeness of your design, and upon that splendid courage with which you announce to those that are to come to you that there shall be no upper limit to intellectual attainment save that which God has placed upon their personalities. We assembled here could not wish more for the welfare of your progress and the success of your design than to hope that some of the genius of that great master of science, he who was to have been with us in body to-day, and whose spirit, we know, must ever be present where men gather in search of truth, may descend upon this place and energize it into creative thought.

Virginia congratulates you upon your choice of the man to carry forward your design and lead your hope to its fulfillment. She is proud that he is one of her own dear sons.

And now to you, Mr. President, from your Alma Mater, I pass the burning cross, and with it Virginia's congratula-

tions upon your high purpose. She looks with motherly sympathy upon your endeavor, and will follow with anxious, loving eyes the development of your plans. She bids you courage, honest work for the day, honest hope for the morrow, and prayerfully God-speed.

PRESIDENT HARRY PRATT JUDSON: *Mr. President, Ladies and Gentlemen*—It is my privilege to bring from the University of Chicago warm congratulations to you on this very auspicious occasion. I bring them from the faculty and the trustees, who know what it is to create a new institution, and who have confidence in what you are about to do here.

I come from a city which, I think, has special reasons to have a great interest in all the Southland. You will pardon me, Mr. President, when I recall one thing you said last night at the opening of the exercises, if I can remember back so long as that, because the opening and the closing of those exercises were very far apart, but I think you said you had forgotten every story you ever heard. I seem also to have forgotten every story I ever heard, except some of the stories about Chicago, and the particular one related last night I am not going to repeat. On consulting my note-book I find that my record for that particular story is 1746. Another one has a record of something like 762. The record of a third one up to the present time is 2107; that is to say, I have heard it repeated that number of times since I began to count, and for this reason, Mr. President, I will not tell any now. I mention this record, however, merely by way of indicating that I think many people are interested in Chicago. The invitation that we have received to your festival indicates at least that we are not forgotten in the South, and in turn I beg to assure you that we do not forget our friends. It has been said that a visitor in Boston is asked,

What do you know? In New York he is asked, How much have you? In Philadelphia, Who was your grandfather? But if I may judge, Mr. President, by the very lavish and extensive hospitality that we have enjoyed in these few days here, it appears that a newcomer in Houston is asked, What can we do for you? And it is because of this spirit that I desire especially to congratulate the City of Houston on this great enterprise. The coming of this institution, so splendidly and wisely erected, we believe will be a great benefit not only to your city but to your entire community.

This occasion takes me back twenty years, to the time when we were founding in Chicago an institution very well provided for at that day. And at that time the heads of our city and State institutions were saying that perhaps the new university would prove to be a dangerous rival. It was not many years, however, before they found that nothing better than the new university could have happened for the spreading of the university idea and its benefits to education. Since that time the other city and State institutions have gone forward by leaps and bounds, in students, in prestige, and in usefulness. Precisely the same way the Rice Institute will prove to be the very best of assets to the colleges and universities and all enterprises of public education in your section.

We congratulate you again, Mr. President, on the splendid and large views with which your institution starts. In the old days the teacher taught what he had been taught, and was satisfied to stop there. In these days a teacher is not alive unless he is on the firing-line of science, unless he has knowledge of the most recent achievements and is pressing those still further in all directions. And we rejoice that you are aiming to devote a large part of your resources to

research in scientific knowledge. The learned chief justice this morning told of some of the things which science has done in our day. There are few things more fascinating. The world has a very great deal to thank science for. For example, take medicine alone. Just think of the communities which a very few years ago were terror-stricken and harassed by epidemics of various malignant diseases. To-day such epidemics are practically unknown. Only a few years ago malaria and yellow fever were ills to be dreaded. To-day, thanks to applied science in medicine, we have found adequate remedies for each of these scourges.

Another cause for congratulation, Mr. President, will appear in what such an institution as yours is going to mean to the community in which it lives. Your great institution is going to be an evangelic light to your entire community, for it will be the means of advancing, among all people of all kinds, the scientific attitude toward life. The future of this university will depend not alone on your splendid and magnificent hospitality, not alone on these beautiful and majestic buildings, not alone on your large programs for study and research, but quite as much will the real fruitage of your institution depend on the men who work here. Its future will be made by the men who carry on in these halls the researches of the scholar; by the men who will lead and guide the university to success; by the men, the professional men, who will go out of it—the lawyers, the engineers, the architects, and the plain, solid men of business who make our country; the men who will put into the life of the Republic the knowledge and the training which they will derive from the results of your venture. On so auspicious a beginning and on so bright a prospect I congratulate you most warmly.

PRESIDENT SIDNEY EDWARD MEZES: *Mr. President, Ladies and Gentlemen*—From the first announcement of William Marsh Rice's magnificent bequest we have looked forward with lively anticipation to this day. We have watched with growing interest the development of the trustees' plans; we rejoiced greatly when we learned that they were resolved to risk the charge of tardiness rather than build heedlessly; we especially rejoiced when we saw chosen to the office of president one of America's ablest and best trained scholars.

In the new president we have found not merely an able and aspiring man, not merely a man of noble conceptions and prophetic visions, but a man so genial of heart, so true in his sympathies, so inspiringly hopeful, that he has carried light wherever he has gone, and conviction also that the institution whose course he guides will bring an influence that deserves and will find a congenial home in Texas.

In some States of the Union the several colleges and universities have not dwelt together in the unity commended of the Psalmist. The colleges, for the most part on private foundations, have often distrusted one another and united in distrust of the State university. This distrust has given rise to conduct at times organized into sustained campaigns, intent on the purpose of mutual harm, and only too successful in attaining that unworthy end. Few pages in the educational history of our country are so disheartening to high endeavor. But from such misguided enterprise Texas has most fortunately been unusually free. Across her broad expanses the winds of freedom and tolerance have swept, scattering the fogs of prejudice and self-seeking as from time to time they formed; and to-day, perhaps as nowhere in America, there prevails practically throughout our State a spirit of the fullest friendliness and co-operation among

colleges and universities, endowed and State-sustained. That the new Rice Institute will strike a note of discord we have no fear. Why should we? Why should not a fresh worker be welcomed into the vineyard, when his aim is our own, with a slant of fortunate difference; when the field is white to the harvest, and the laborers are few? Seeing that barely one out of every ten high-school graduates takes any higher education whatever; that in Texas only one out of twenty of our boys and girls goes to college, whereas in California, for example, the proportion is one in eight; how can we do otherwise than rejoice at the founding of a new agency to help alter these distressing figures? Facing together some of the most vital problems before State and Nation, shall we not be glad that the new institution is now among us, blessed with the means to render great service?

And now, President Lovett and members of the Board of Trustees, we welcome the Rice Institute into the brotherhood of Texas colleges and universities; we welcome you formally and with all our hearts. You will play a splendid part in the upbuilding of Texas; you will help train our youth; you will cherish learning; you will foster research; your achievements and example will stir us to renewed endeavor. In the noble setting of spacious grounds; with buildings planned by a great artist; with a faculty chosen from all the world; with the stimulus of a rapidly growing city about you, to all human seeing the future holds for you a glorious destiny. One and all we unite to say:

Esto perpetua!

PRESIDENT LOVETT: *Ladies and Gentlemen*—For the trustees and faculty of the Rice Institute I thank most sincerely these gentlemen and all the institutions they represent for their cordial greetings and for the warm welcome with

which they receive us into their fellowship and that of the world of learning. I can find no words in which adequately to say to them what their presence means to us at this time. In return for their great kindness we can only offer them the place in our history which they have made for themselves. And most cordially do we invite them one and all to come back. For their coming we thank God, and from their messages we take courage.

